The Iron Age

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Steel-Making Ladles.

The practice of carrying melted cast iron direct from the blast furnace to the Siemens hearth or the Bessemer converter saves both money and time. It has rendered necessary the construction of special plant in the form of ladles of dimensions hitherto quite unknown. Ladles are also required in steel foundry work, and one of these for the Siemens-Martin process is illustrated by Fig. 1. These ladles are made in sizes to take from 5 to 15 ton charges, or larger if required, and are mounted on a very strong carriage with a backward and forward traversing motion and tipping gear for the ladle. The ladles are butt-jointed, with internal cover strips, and have a very strong band shrunk on hot about half-way in the depth of the ladle. This forms an abutment for supporting the ladle in the gudgeon-band, being secured to this last by latch-bolts and cotters. The gearing is made of cast steel, and there is a platform at one end for the person operating the carriage or tipping the ladle. Stopper gear and a handle are fitted to the ladles to regulate the flow of the molten steel from the nozzle at the bottom.

Fig. 2 shows a spiegel ladle of the pattern used at Cyfartha. It requires no description. Fig. 3 shows a tremendous ladle constructed for the Northeastern Steel Co. for carrying molten metal from the blast furnace to the converter. It holds 10 tons with ease. It is an exceptionally strong structure. The carriage frame is constructed throughout of 1-inch wrought iron plates, and is made to suit the ordinary 4 feet 8½ inches railway gauge. The axle-boxes are cast iron, fitted with gun-metal steps. The wheels are made of forged iron, with steel tires and axles. The carriage is provided with strong oak buffers, planks, and spring buffers; the draw-bars also have helical compression springs of the usual type. The ladle is built up of ½-inch wrought-iron plates, butt-jointed, and doubled riveted butt straps. The trunnions and flange couplings are of cast steel. The tipping gear, clearly shown in the engraving, consists of a worm and wheel, both of steel, which can be fixed on either side of the ladle as may be desired. From this it will be seen that Messrs. Stevenson & Co. have made a thoroughly strong structure in every respect, and one, therefore, that will commend itself to most steel-makers. We understand that these carriages are made in various designs and sizes to meet special requirements. Thus, Fig. 4 shows one of different design made for a steel works in the North. This is also a large ladle. The carriage is supported on helical springs and solid steel wheels. It will readily be understood that very great care and honesty of purpose are required in making these structures. A break-down might any moment pour 10 tons of molten metal on the ground, with the most horrible results.—*Engineering.*

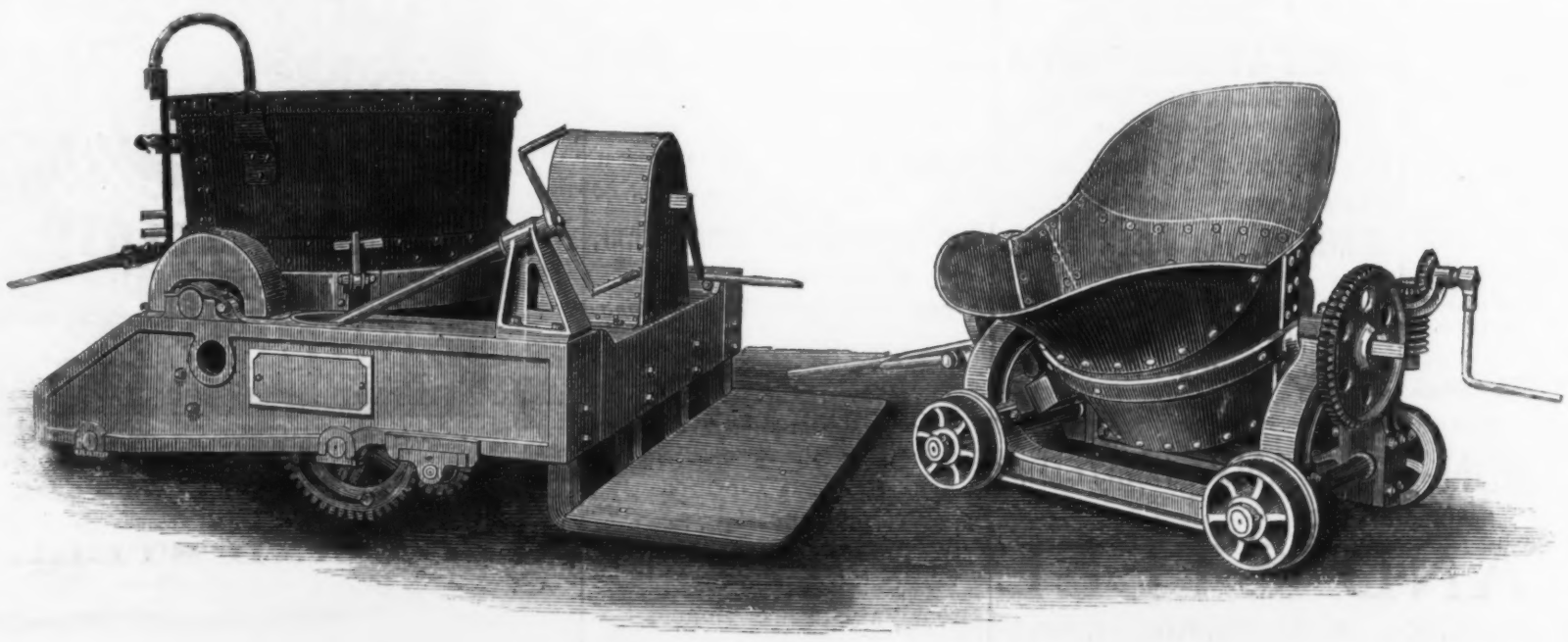
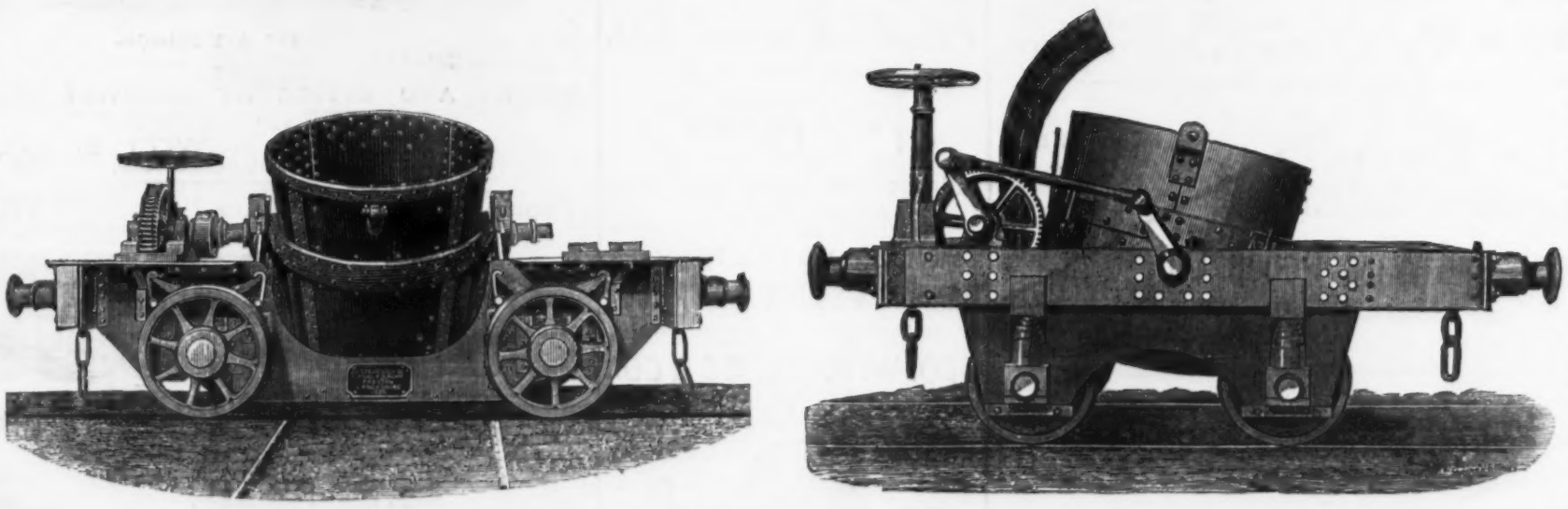


Fig. 1.—Ladle for Siemens-Martin Process.

Fig 2.—Spiegel Ladle.



Figs. 3 and 4.—Ladles for Carrying Molten Metal from Blast Furnace to Converter.

LADLES FOR STEEL MANUFACTURE.

Expansion in Compound Engines.

Although it is really very easy to ascertain by calculation the degree to which steam is expanded in a compound engine, a good deal of confusion appears to exist on the subject, especially among young engineers. It is for their benefit that the London *Engineer* publishes the following article:

The question generally presented runs like this: In a compound engine with two cylinders and an intermediate receiver the steam is cut off at five-eighths of the stroke in the high-pressure cylinder and three-fourths in the low-pressure. What is the total expansion? Now, to begin with, such a question is incomplete, and cannot be answered at all. In no case can the total expansion in a compound engine be known unless the capacities of the cylinders are also known. The capacities of the cylinders and the point of cut-off in the high-pressure cylinder being given, it is very easy to calculate the total expansion. The point of cut-off in the low-pressure cylinder and the intermediate receiver have nothing at all to do with the matter. All the steam sent into the engine at each stroke has ultimately to fill the low-pressure cylinder. Therefore, we have only to divide the capacity of the low-pressure cylinder by the capacity of the space in the high-pressure cylinder, which is filled with steam at the moment the cut-off valve closes, in order to obtain the ratio of expansion. To make this statement quite clear, we will state a case for the sake of illustration:

A double-cylinder compound marine engine has a high-pressure cylinder 30 inches in diameter, a low-pressure cylinder 56 inches in diameter and a stroke of 3 feet. Steam of 90 pounds pressure is cut off at 0.6 of the stroke in the high-pressure and at 0.8 in the low-pressure cylinder. What is the ratio of expansion? The stroke is 36 inches, and 0.6 of this is 21.6 inches. Allowing for the cut-off not being quite sharp, we shall call this 22 inches in round numbers. The area of a 30-inch piston is 707 inches nearly, and $707 \times 22 = 15{,}554$ cubic inches. Adding to this 354 cubic inches for clearance, and, say, 650 inches for port space filled, we have a total in round numbers of 16,560 cubic inches of steam supplied at each stroke. Now, assuming that no condensation takes place, the whole of this steam must ultimately find its way into the low-pressure cylinder at each stroke and fill it. The area of a 56-inch piston is 2463 inches. Allowing, as before, ¼ inch for clearance, we have $2463 \times 36.5 = 89{,}899.5$. Adding the port space, we shall have a total of 90,500 cubic inches which must be filled with fresh steam at every stroke—this is assuming that no compression takes place, a point to which we shall return presently. Dividing 90,500 by 16,560, we have 5.46 to 1 as the ratio of expansion. It will be seen that we have taken no account of the presence of an intermediate receiver or of a cut-off valve on the low-pressure cylinder, nor is it necessary that we should. The effect of the first is to modify the initial pressure in the low-pressure cylinder, and of the second to regulate the amount of work done respectively in the two cylinders, but neither the one nor the other can alter the ratio of total expansion. After the engine has started the pressure will rise and fall in the intermediate receiver within well-defined limits at each stroke. Its presence will reduce the initial pressure in the large cylinder and elevate the terminal pressure. It plays the part, in short, of a large clearance space, and that is all.

To make this point quite clear, we may proceed in another way. Assuming that the initial pressure is 105 pounds absolute, the weight of a cubic foot of steam will be 0.2414 pound; therefore 16,560 inches will weigh 2.317 pounds. Do what we will, this weight of steam must be passed through the engine per stroke. At the end of the stroke of the small piston its delivery into the intermediate receiver will commence, and by the end of the return stroke it will all have been passed into the receiver. On the other hand, with the beginning of the stroke of the low-pressure piston it will commence to be drawn out of the receiver, and it must all have been drawn out at the time the low-pressure cut-off valve closes. If it was not all drawn off, then the pressure in the receiver would rise continually as the engine ran, until no exhaust from the high-pressure cylinder could take place. If more were drawn off, then at last a point would be reached at which a vacuum would exist in the intermediate receiver. Both assumptions are absurd. Therefore it is clear that the intermediate receiver has no more to do with determining the total range of expansion than has the steam-pipe which conveys steam from the boiler to the engine. We can use the figures we have given above to check the accuracy of our statements. We have said that the total expansion under the circumstances stated would be 5.46 to 1. Now, $\frac{105}{5.46} = 19.2$ pounds. That will be the terminal pressure in pounds in the large cylinder, and 20 cubic feet of steam of this pressure weighs within a minute fraction 1 pound. We have seen that the quantity of steam passed through the engine per stroke is 2.317 pounds, and $2.317 \times 20 = 46.34$ cubic feet. Allowing for the use of round numbers and abbreviated decimals, this corresponds with the capacity of the low-pressure cylinder.

We have neglected in our calculation the effects of compression. But it will be understood in a moment that the only way in which this can affect the question is by reducing the quantity of steam withdrawn from the boiler at each stroke. If the compression is just sufficient to fill the clearance with steam of the boiler pressure, then clearance may be regarded as eliminated, and the ratio of expansion will be augmented, because a less weight of fresh steam will be delivered into the intermediate receiver and thence into the low-pressure cylinder at each stroke. In the same way we have entirely neglected the effect of cylinder condensation, which will be virtually to augment the ratio of expansion, because a smaller weight of steam than that delivered to the high-pressure cylinder will be found in the low pressure at the end of the stroke. But, be the weight small or great, it must fill the cylinder. The gap between the two diagrams does not affect the ratios of expansion, except in so far as it is due to condensation. Apart from this it has no bearing whatever on expansion. It is due to the equalizing action of the intermediate receiver. The effect of the cut-off valve on the low-pressure cylinder is solely to maintain the average pressure in the intermediate receiver higher than it would be without it, and therefore to reduce the power developed in the high-pressure cylinder by augmenting back pressure. Whether the steam is or is not cut off in the low-pressure cylinder during the stroke, the same weight of steam must find its way at each stroke into the low-pressure cylinder. If less space in the large cylinder is allowed for the reception of steam, then the pressure will augment in proportion. Thus, if the cut off took place in the low-pressure cylinder when the piston had made about 6¼ inches stroke, the receiver pressure would be identical with that in the boiler, and the high-pressure cylinder would do no work whatever. But the ratio of expansion would be still 5.46 to 1.

The Plymouth Consolidated Gold Co. sends us its annual report for 1885. It is a consolidation of the Empire, Amador, Pacific and Plymouth companies in California. Since the reorganization, June 1, 1883, the company has produced $2,441,216.29 in gold, and paid out $1,525,000 in dividends.

The Patent on the Spencer Machine for Making Machine Screws.

The decision of Judge Shipman recently filed in the case of the Hartford Machine Screw Co. *vs.* Reynolds & Co. is one of unusual interest and importance. The patent involved is reissued letters patent number 9290, dated July 13, 1880, to C. M. Spencer, assignor to the plaintiff company, for an automatic machine for making machine screws. This machine is a very ingenious and important one, and is destined to work as great a revolution in machine-screw making as was wrought in the art of wood-screw making by the introduction of automatic machinery. The plaintiff company have several hundred machines working in Hartford, and several hundred more are being operated in this and foreign countries by their licensees. The machine may be described generally as an automatic machine for making screws one after another upon the end of a long metal rod, which is fed intermittantly into the machine. The invention of Spencer extends to the entire mechanism by which a machine for feeding a rod in the intervals between the fashioning operation is made automatic. This general statement will disclose to persons acquainted with the art of screw-making a general idea of the great importance of Spencer's improvement.

It may be said generally that Spencer's invention is threefold, consisting first: In the mechanism for feeding and rotating the rod; 2, in the devices for fashioning the screws, and, 3, in the severing mechanism. All these are automatic and one attendant can oversee the working of a number of machines. The suit just decided related specially to the automatic feeding and rotating mechanism, consisting of a friction feed-tube within the mandrel of the machine in combination with the mandrel itself, and certain jaws and cams ingeniously contrived so as to time the several motions of the feed with reference to the work to be done by the fashioning and severing mechanisms. There is also in the combination a jaw-closing sleeve, and the controversy, so far as infringement was concerned, related to the location of this sleeve. The defendants claimed that in their machine the sleeve being on the outside of the mandrel, instead of within the mandrel, there could be no infringement. The court held this claim to be untenable, and construed the plaintiff's patent so as to cover the feed combination, whether the jaw-closing sleeve was within or without the mandrel. The defense also claimed that the reissue was void for expansion and that the invention was anticipated. The proof to the contrary was, however, overwhelming in its nature, and both claims were decided by the court adversely to the defendant, against whom the court ordered an injunction and an account. The Hartford Machine Screw Co. aside from being the owners of the Spencer principles, which may be described as the monitor or revolving turret system, are also owners of the original Curtiss patents, the Stehli or Swiss invention of a later date, and others for the making of screws automatically, which give them control of all the popular forms of screw machines made automatic, and to construct a machine without conflicting with some of their patents would seem to be impossible. We understand that other suits will immediately be commenced under these various patents. C. E. Mitchell for the plaintiff. B. F. Thurston and John K. Beach for defendants.

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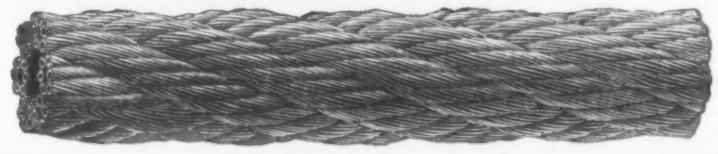

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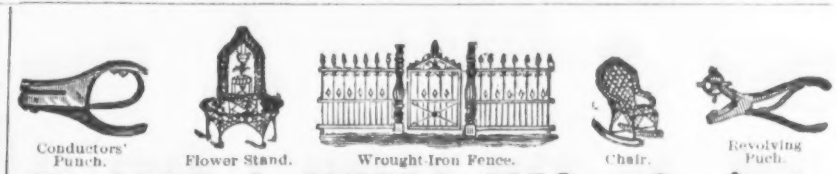

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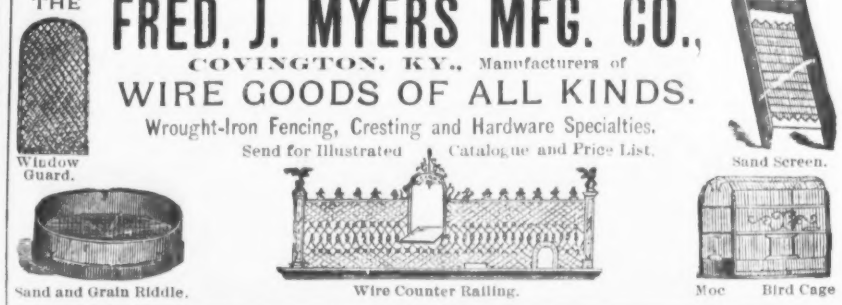

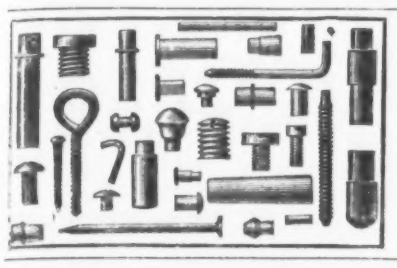

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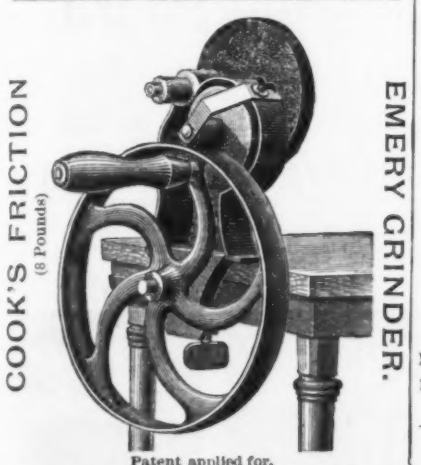

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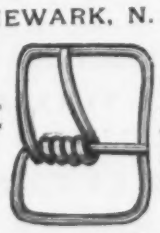

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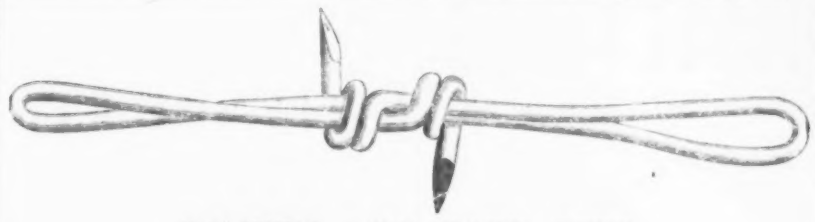

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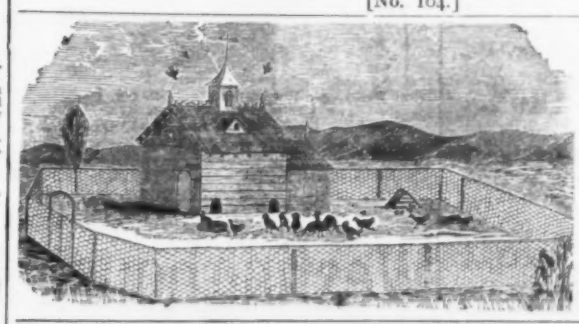

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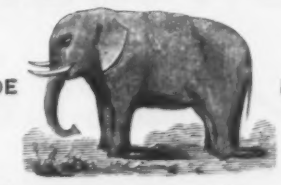
TRADE  MARKS.

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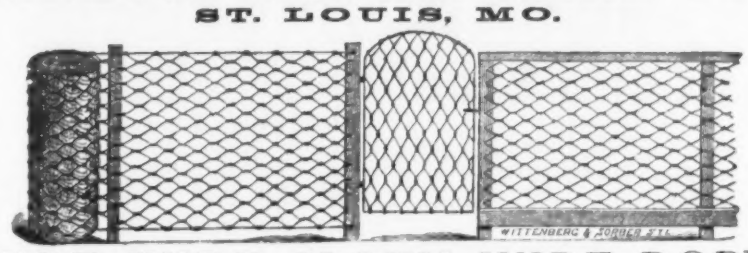

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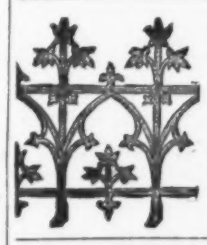

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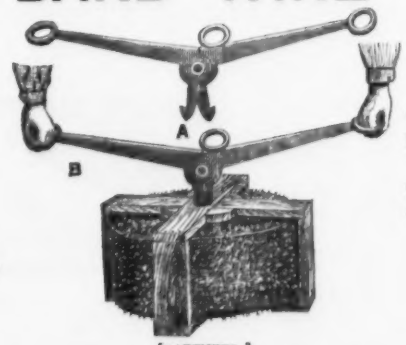

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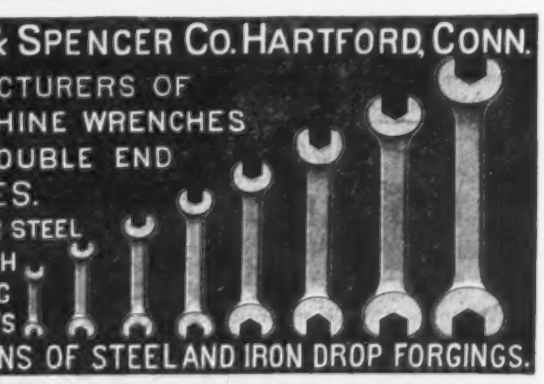

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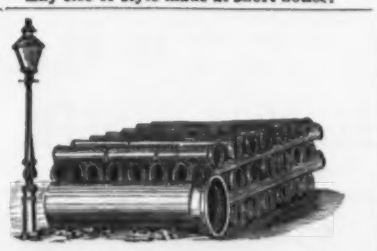

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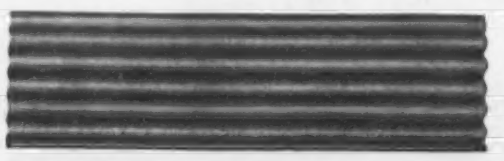

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Latest Legal Decisions.

IMPERFECT INCORPORATION—CONTRACTS—INDIVIDUAL RESPONSIBILITY.

Certain persons undertook to associate themselves together as a corporation, but the proper steps were not taken. Contracts were made by these persons as a corporation, and the creditors sued them individually and recovered a judgment. The case—Johnson *vs.* Corser—was carried to the Supreme Court of Minnesota, where the judgment was affirmed. Judge Dickinson, in the opinion, said: "The attempt to become incorporated was ineffectual to limit the individual liability of the associates, and upon any contract which they may be found to have authorized to be made, or which they may have ratified, although in terms the contract was made as the contract of the association or assumed corporation, the members may be held to an individual responsibility. While, if the other contracting party were to charge the defendants in their assumed corporate character, they might not in some cases be heard to deny their corporate existence, yet, there being in fact no such existence, the plaintiff may go behind the assumed corporate character, and hold the real principals to responsibility for the acts of those whom they may have clothed with authority to act in behalf of the association. The plaintiff asserts, as a rule of law applicable to the case, that from the mere failure to perfect the contemplated incorporation the association, after proceeding to carry on the proposed enterprise, became a partnership, and the members copartners, with authority, implied from their relations, in each member to bind all the associates by any act within the scope of the business carried on by the association. We cannot sanction the application to this case of the doctrine of implied agency as it is recognized in ordinary business copartnerships. If it be conceded that the principle upon which the plaintiff relies exists, and is applicable in cases where the business contemplated and carried on by the associaiton and the purposes for which it is presented are such as involve the essential elements of a partnership undertaking, or where the articles of association contain all that is essential to create a partnership, the principle is not applicable to this case, in which those conditions do not exist. Here it was proposed to grade a public street by co-operation. We deem the liability of the defendants to rest upon the ordinary principles of contract and agency, and not upon the grounds of an existing copartnership."

EMBEZZLEMENT BY BANK OFFICER.

P. and his wife gave their mortgage to one G. in trust for the use of a bank in which he, P., was an officer, to prevent his prosecution for embezzlement of its funds, and for a conspiracy to defraud it, for which he stood indicted. The prosecution was abandoned, as agreed, and a civil suit for the money was settled also upon the same condition. In an action of ejectment, the conveyance being an apparent deed, Mrs. P. defended on the ground that the deed was void because of the alleged consideration, but she was beaten, and carried the case—Pearce *vs.* Wilson—to the Supreme Court of Pennsylvania, where she succeeded. Judge Sterret, in the opinion, said: "Misdemeanors of so grave a character as either of these in question cannot be compromised; only those can be settled which are of personal injury and damage to the prosecutor and do not specially affect the public. The offenses charged in the indictments are of a very high grade, much more detrimental to the common weal than many of the lower grades of felony. As officers of an incorporated bank, chartered in part at least for the public benefit, the parties accused occupied a *quasi* public position. The embezzlement of money intrusted to their care by those occupying such positions is a crime of much more public importance than ordinary larceny. While the fraudulent alteration of the books, mutilation and destruction of the accounts, of such an institution, with intent to defraud it and those who have intrusted their money and securities to its care and keeping is not, technically, forgery, it is quite as bad and generally worse in its far-reaching consequences and injurious effects on the public interests. Ever and anon whole communities are startled and public confidence shaken to its very foundation by the commission of such crimes. To stifle their prosecution for a paltry pecuniary consideration is contrary to public policy and a mere mockery of justice in her own temple. This judgment must be reversed."

PROMISSORY NOTE—PAYMENT BY THIRD PARTY.

W. made a promissory note to G., and he paid it in part, the payments being indorsed on the note. The balance of the note was called for and W. requested B. to pay it. This B. agreed to do, and he went with W. to A., who held the note, and said to A.: "B. will pay this note off," to which A. replied: "That is all right," and B. said: "In a few days I will have the money ready." He went to A. as he promised and paid the balance due, and, after marking the payment upon his account-book, A. was about to cancel the note when B. requested him not to cancel it, whereupon he delivered it to B. uncanceled. B. died and his administrator sued G. as an indorser. G. defended on the ground that the note had no existence, having been paid, and so the court decided. The case—Binford *vs.* Adams—was carried to the Supreme Court of Indiana, where the judgment was affirmed. Judge Elliott, in the opinion, said: "B. was a mere volunteer, for he was a stranger to the transaction, without any interest to protect or rights to preserve, and therefore did not come within the rule subrogating one who paid a note having rights of his own to protect to the rights of the holder of the note. There is an important difference between the payment of a note and a purchase of it from the owner. The sale of a note, to be valid, must be made by a buyer to a seller; there must be mutual assent, and there must be a consideration. The payment of a note is not a contract; it is the discharge of a contract. That he who paid the note asked for it uncanceled was not enough in itself to overcome the presumption of payment. Where a bill of ex-

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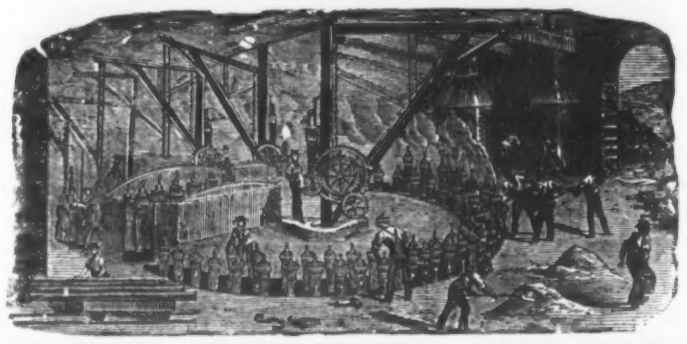

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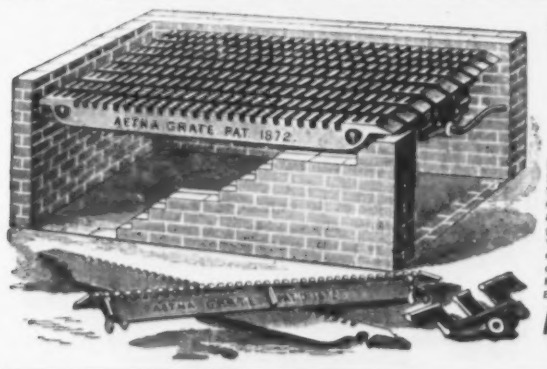

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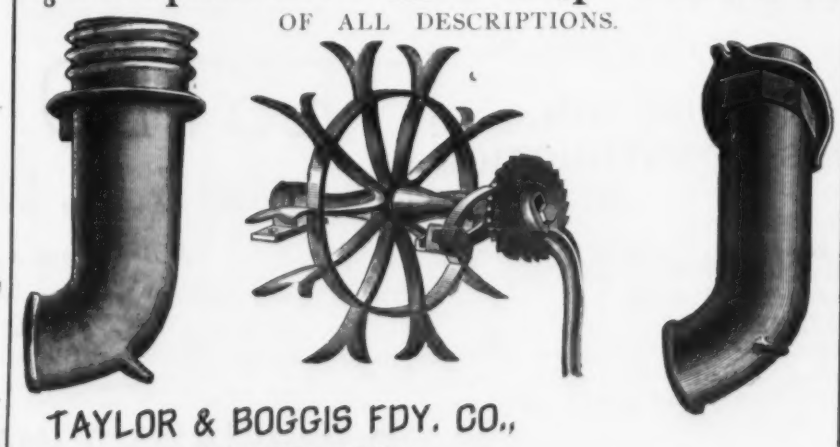

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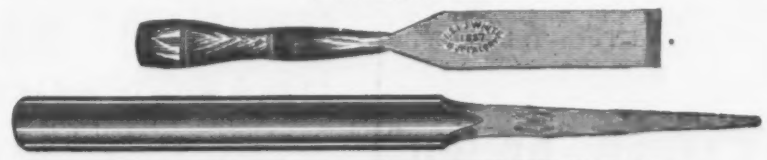

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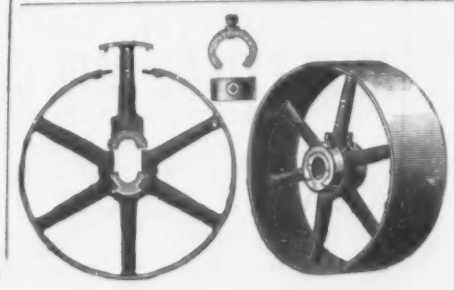

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change was paid to save it from dishonor, the draft is not paid, but with this exception there is no reason why an officious payment of a bill or note should not be held to cancel it. In this case the owner of the note declares that nothing was said to him about the purchase of the note, and that it never was purchased from him. Stress is laid on the agreement between the maker of note and B., but this agreement will not control, for the real question is, not what was the agreement between those parties, but what was the agreement between the person claiming as purchaser and the owner of the note, in whom alone was vested the power to sell. The authority to sell was in the owner, and no one could buy the note except from him as the vender. A seller of a note incurs some liability, although he transfers it simply by delivery, for he warrants the genuineness of the note. Clearly, therefore, he must be a party to the sale, or there cannot be a sale."

LIBEL—CALLING ATTORNEY-AT LAW "SHYSTER."

G. was denounced in a newspaper as a "shyster," and the paper at other times had used like charges against him. He sued for damages for the libel, and he was permitted to put in evidence, to prove malice, other articles of the paper speaking of him to the same effect. A judgment was recovered by him, and the case—Gribble *vs.* Pioneer Press Co.—was taken to the Supreme Court of Minnesota, where the judgment was affirmed. Judge Berry, in the opinion, said: "1. The word 'shyster' is defined by Webster to mean 'a trickish knave; one who carries on any business, especially a legal business, in a dishonest way,' and is evidently capable of having reference to the professional character and standing of a lawyer, and is, clearly, libelous. 2. Repetitions of a false charge, or publication of like libels, are admissible, though published a year or more apart, to show a malicious disposition in the publisher, and may be given in evidence for that purpose. The rule has been criticised as illogical and monotonous, but it rests upon a common-sense judgment of human nature and a practical knowledge of its motives and ways."

SALE—DELIVERY OF GOODS—ACCEPTANCE.

In an action to recover for the damages on wool bought, but which the buyer refused to take, the defense was made that the buyer was not bound, as the contract was not in writing. It was shown on the trial that the wool was to be delivered at the railroad station, and that it was sent there, but that the defendant's agent refused to accept it, saying that it was damp. The vender offered to take off 25 pounds a bale, but the agent declined, and it was agreed that there should be a delay of eight or ten days after the rain to weigh the wool, if it was dry enough. At the end of that time the agent still refused to take the wool, and vender then sold it at the station for the best price he could get, and brought his action for the difference in the price and recovered a judgment. The defendant carried the case—Jamison *vs.* Simon—to the Supreme Court of California, where the judgment was reversed. Judge Ross, in the opinion, said: "The contract was an oral one, and no part of the price was paid; under the circumstances the contract is by the statute declared to be invalid unless the buyer accepts and receives part of the thing sold. There must be not only a delivery of the goods by the vender, but a receipt and acceptance of them on the part of the vendee, and this acceptance must be voluntary and unconditional. Even the receipt of the goods without an acceptance is not sufficient. Some act or conduct on the part of the vendee or his authorized agent, manifesting an intention to accept the goods as a performance of the contract and to appropriate them, is required to supply the place of a written contract. There was not an acceptance here, clearly, and the plaintiff cannot recover."

ASSIGNMENT OF A DEBT—CONSIDERATION—DELIVERY.

F. owed K., and K. owed H., and F. promised, at K.'s request, to pay H. what he, K., owed him or might owe him. This F. agreed to do, and C., on the faith of this assignment, sold to K. some more goods. A creditor of K.'s sued him and attached the debt due him by F. In the suit upon the attachment H. appeared as a claimant of the amount in F.'s hands, but on it appearing that the assignment to him was oral only, and that no consideration passed, the court gave the attaching creditor judgment. H. carried the case—White *vs.* Kilgore—to the Supreme Judicial Court of Maine, where the judgment was so far modified that he was allowed the amount of his claim at the time the attachment was levied. The Chief Justice (Peters), in the opinion, said: "The doctrine of equitable assignment of claims and demands is of long standing, and is an expanding, growing doctrine. The general rule of the courts is that, to establish a mere oral or unwritten assignment of a claim or demand, both a consideration and a delivery must be proved, not only as against creditor and subsequent purchasers, but as between the parties themselves. The element of valuable consideration as between the parties has been quite rigidly adhered to. The presence of a valuable consideration, says the Court of Appeals of New York, becomes the essential and necessary element of an equitable assignment. And a delivery is as essential as an assignment. A bond or note may be assigned by a mere delivery for a valuable consideration. A book account will pass by the delivery of a copy with an order on the debtor. And circumstances may establish a delivery. And a constructive delivery may be shown by conduct indicating that the assignor relinquishes and the assignee assumes control of the claim or demand. This was the case here. The creditor assigned the claim he had against F. to H., who accepted it and took control of it; but, as the consideration was valuable only to the extent of the assignor's debt to the assignee, he takes an interest in the claim as against creditors of the assignor only to the amount of that debt. To that extent, then, he may have judgment; the balance of the demand will go to the attaching creditor."

METALLURGICAL.

The After-Blow in the Basic Process.

The characteristic reaction in the basic process is the after-blow, through which the phosphorus is oxidized. This has been generally deemed an absolute necessity, and particular interest attaches, therefore, to the statements of M. Ch. Walrand, a well-known French metallurgist, who gives some details of the experiments made with the object in view to suppress the after-blow entirely. In the Bell and Krupp washing processes, which at one time were so keenly watched by the iron trade, the phosphorus is eliminated while the silicon is removed, partly at least, and before the carbon begins to oxidize. In a paper published in the *Revue Universelle des Mines* it was stated, as the result of experiments made at Creusot in 1879 and 1880 with the basic process, that if the cinder was liquefied in the beginning of the blow by any method the greater part of the phosphorus might be eliminated without an after-blow. Practice at Creusot had shown that to be the case, because for special reasons growing out of the character of the pig it was an object to reduce the length of the after-blow as much as possible. The method employed was the following: With the lime about 40 to 50 kg. of fluorspar were added in order to liquefy the cinder at the outstart and thus make it basic at once. Ordinarily the lime does not melt before the temperature of the bath is high enough—that is, to say, at the beginning of the after-blow. The phosphorus, being in contact with a silicious cinder, cannot enter the compound until it has become basic through the melting of the lime. This may be offered as an explanation of what occurs in the basic converter, while in puddling and in the Bell process the phosphorus comes into contact with a cinder which is always basic.

Although the after blow was reduced by one-half through this method, it was not generally adopted, for the following reasons: Whenever the pig, which comes direct from the blast furnace, was very high in silicon, this method was adopted, but when the silicon contents came within the normal range, say 0.60 to 1 per cent., it was found necessary to abandon the fluorspar, because then the blow became cold at once and trouble was experienced from skulls to such an extent that they counterbalanced the shortening of the after-blow. The cause of this trouble was sought for a long time, because it was thought impossible to admit that the replacing of only 50 kg. of lime by 50 kg. of fluorspar should be the only cause of the bad results. Every time the fluorspar was added the same accidents occurred when the pig had a composition within the regular specification, and the trouble disappeared as soon as the fluorspar was dropped. When the phases of the new method with fluorspar are studied, it is noted that, according to the quantity added, the cinder becomes liquid more or less rapidly, the length of the after-blow is materially shortened until it disappears entirely, although the total time required for the operation is not shortened, and although the waste remains the same. This is the result of many trials made at the Athus Steel Works in 1884. It has been often shown that by adding 300 to 400 kg. of fluorspar to a 10-ton charge there was no after-blow. The following was the report from the laboratory: A sample taken after the first period, when the carbon commenced to burn, contained phosphorus 0.22 per cent. (the pig carried about 2.3 per cent. of phosphorus), phosphoric acid in cinder 18.0 per cent. The phosphorus in the steel after the drop of the flame, when ordinarily the after-blow begins, was 0.052 per cent. These facts were verified every time, and yet the method was given up because of the formation of skulls.

Finally the cause of this unfortunate chilling, which does not occur in the ordinary basic process, was discovered. Phosphorus, as well as silicon, by its combustion yields a solid product. The temperature developed by this combustion considerably elevates the heat of the bath of metal, because the heat remains concentrated in the molten mass. Carbon, on the other hand, by its combustion produces gaseous products, which escape, carrying off a part of the heat in the bath. The result is that, when the combustion of the phosphorus is brought about before or at the same time as that of the carbon, the heat-producing elements in the pig are not so well utilized as when they are burnt in the following order, as in the ordinary basic process: Silicon, carbon, phosphorus. In this the ordinary manner of conducting the process the phosphorus leaves in the bath all the heat which is the result of its combustion, which it does not in dephosphorizing without an after-blow.

As has been stated, this cooling effect was greater the lower were the silicon contents. This is not an an isolated fact; it is the experience obtained in hundreds of blows at Creusot, Athus and Longwy. Nothing is to be gained, therefore, in trying to shorten the after-blow in a normal dephosphorizing operation. From a scientific point of view it is an interesting fact that the after-blow may be shortened at will, but until now practice has declared against this method, which offers no advantages so far as waste is concerned, especially when the numerous skulls are counted in. M. Walrand does not in his paper, which is printed in the *Annales Industrielles*, refer at all to the basic open-hearth process. It is difficult, however, from his experience in the Bessemer converter to escape the conclusion that in the open-hearth the addition of fluorspar would prove valuable. This, we believe, has been demonstrated by the experiments of Mr. James Henderson, who was the first to call attention to the use of fluorspar in this connection.

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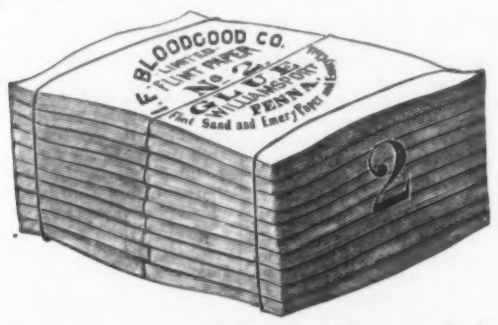

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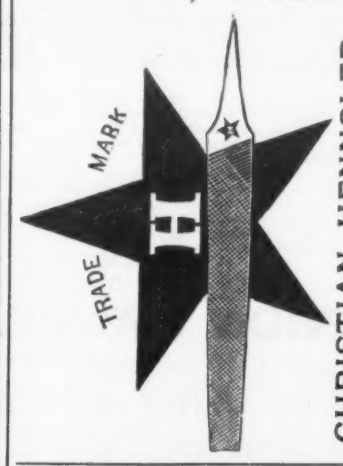

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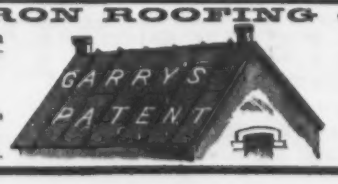

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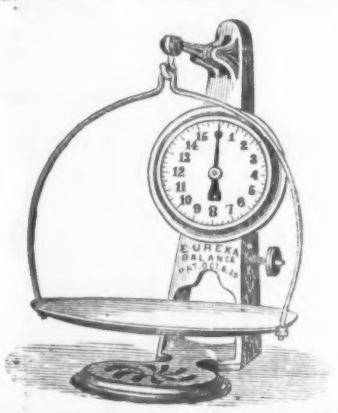

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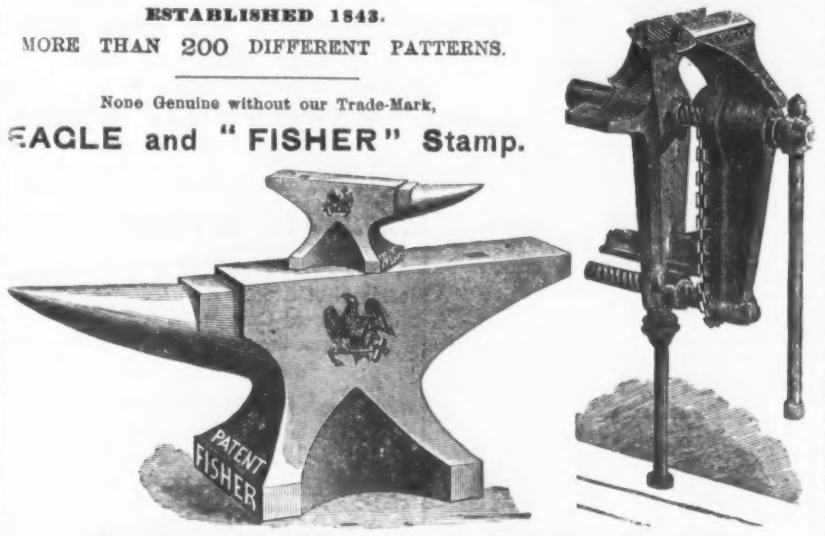

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stances in which steel bars and plates had failed, in their opinion, in an unaccountable manner. In nearly all such cases a cursory examination brought the fact that the plates in question had been subjected to bending or hammering while hot, and there could be little doubt that while they were being worked these plates were at a blue-heat, or, as smiths and boiler-makers term it, a "black-heat." It should by this time be well known that such treatment was the most injurious to which steel could possibly be subjected, and therefore such failures could not properly be regarded as unaccountable. Iron possessed the same peculiarity, but, being less ductile than steel, similar failures were not so glaring. The author then mentioned cases in which plates, both of iron and steel, had failed without this treatment, although the quality of the material was good, according to the usual tests. Three hundred and thirty experiments had been made in connection with the subject of the paper, and consisted mainly of bending and of tension tests. The results were contained in tables and in diagrams.

It appeared that the limit of elasticity of both iron and steel was raised by repeated tension testing. In some cases the limit rose above the original breaking stress, although the ultimate breaking stress was only slightly effected. The total elongation was reduced by previous mechanical operations, while the contraction varied considerably. A test piece which had been shortened when cold showed a reduction of the elastic limit, but another piece, which had been shortened when hot, showed an increase. By the expression "blue-heat" the author meant to include all those temperatures which produced discolorations (ranging from light straw to blue) of the surfaces of bright steel or of iron. The author showed that steel which had been bent cold, either once or twice, would stand almost as many subsequent bends as the original test pieces. But if the same material was bent once while blue-hot it lost a great deal of its ductility. Out of 12 samples, in which two preliminary hot bends were made, nine broke with a single blow of a hammer, and the other three only stood one or two subsequent bends. Thin Lowmoor iron did not break quite so easily, but supported about one half the original number of bends. The following table contains some of these results:

	Medium hard steel. ⅜ in.	Mild steel. ⅜ in.	Very mild steel. ⅜ in.	Lowmoor iron. 3-16 in.
Unprepared or annealed	21	12½	26	20
Broken hot (blue)	2½	1½	2½	3
1 preliminary hot bend	3 mean.	2½ mean.	11 mean.	12 mean.
2 preliminary hot bends	⅓ mean.	⅓ mean.	⅔ mean.	10 mean.
1 preliminary cold bend	20	9½	.....	.....
2 preliminary cold bends	19½	8½	19	13
4 preliminary cold bends	.....	.....	13	11
8 preliminary cold bends	.....	.....	15	6

The experiments all pointed unmistakably to the greater danger incurred if iron or steel were worked at a blue-heat. The difference between good iron and mild steel seemed to be that iron broke more readily than steel while being bent; that iron suffered more permanent injury than steel by cold working, but that, if it had successfully withstood bending when hot, there was little probability of its flying to pieces when cold, like mild steel. It was a common practice among boiler-makers to "take the chill out of the plate" if it required a little setting, or to set a flanged plate before it was cold. This was nothing else than working it blue-hot, and should not be allowed. All hammering or bending of iron and steel should be avoided, unless they were either cold or red-hot. Where this was impossible, and where the plate or bar had not been broken while blue-hot, it should be subsequently annealed. It was satisfactory to learn that, since the introduction of mild steel, a practice had been gaining ground among boiler-makers, which must have the effect of guarding against such failures, and should be encouraged. It consisted in the cessation of work as soon as a plate which had been red-hot became so cool that the mark produced by rubbing a hammer handle or other piece of wood over it would not glow. A plate which was not hot enough to produce this effect, yet too hot to be touched by hand, was most probably blue-hot, and should under no circumstances be hammered or bent.

The theory that local heating of a plate set up strains which sometimes caused failures did not appear to be supported by the experiments. But it was doubtful whether the proposal to locally reheat a plate which had been worked when hot, in order to anneal this part, should be carried out. Several test pieces were made red-hot or blue-hot, and then were slowly cooled by holding one of their edges in cold water. As might have been expected, the medium hard steel lost much of its ductility. The other steels and the iron were not greatly affected, as would be seen from the following table:

	Medium hard steel.	Mild steel.	Very mild steel.	Lowmoor iron.
Unprepared or annealed	21	12½	26	20
Quenched red-hot in boiling water	24	10	.....	.....
Quenched red-hot in cold water	1	10	19	20
Red-hot, quenched edge in cold water	3	8	25	27
Blue-hot, quenched edge in cold water	3	6¼	19, 19	21, 14

The author concluded by suggesting that the question should be further investigated, and that steel manufacturers should endeavor to ascertain whether every quality of steel was made permanently brittle by being worked at a blue heat, or whether this was independent of the various impurities contained in it, and also whether prolonged exposure to a blue-heat could produce the same effect.

A new arrangement of tapping-holes for open-hearth steel-melting furnaces has been patented by G. W. Goetz, of Cleveland, Ohio. A series of tapping-holes are placed respectively in separate bricks, one above the other. In tapping the furnace and drawing off the metal intermittently a hole next below the surface of the molten metal may be used. When it is required to stop the flow of metal by reason of the low head of metal above such tapping-hole, the hole may be plugged without difficulty in the usual manner, and in case this tapping-hole becomes cored and inoperative the next hole below—or, in, fact, any one of the lower holes—is available and may be tapped as required. Water columns are provided in front and next adjacent on either side of the series of bricks containing the tapping-holes. In case the molten metal finds its way through the seam of the brickwork, these water columns will chill the metal and prevent leakage.

A. Davy, of Sheffield, England, has patented a Bessemer apparatus which answers the double purpose of a foundry ladle and converter, so that the loss of heat by the transfer of the metal from one vessel to the other may be avoided. A portable converter, provided with air inlets in its gudgeons and their bearings, is located between two stand-pipes which are adapted to support the converter during the blow, and to make connection with the air inlets to the tuyeres. The stand-pipes are either fixed or mounted on a bogie, according as the operation of blowing is or is not carried on within the radius of the crane. That is to say, when the operation is carried on within the reach of the crane, the standards are fixed and the connection with the air main is permanent, while, when the blowing is carried on beyond the reach of the crane, the standards are fitted upon a bogie carriage, and the converter is detached from the crane and conveyed by the bogie to the blowing stack.

A process of producing wrought-iron and steel castings said to be made homogeneous by the addition of aluminium has been patented by C. G. Wittenström, of Stockholm, Sweden. The inventor says that castings of wrought iron or mild steel may be obtained solid without changing the intrinsic quality of the metal by the addition of aluminium, either alone or in the shape of an alloy. The addition is to be made after the iron or steel has been melted, and preferably just before the pouring is commenced. The melting point of aluminium is about 800° F., and the effect of its introduction is to lower the melting point of the mixture and thereby render it more fluid, so that the gases in the metal pass away easily, the metal runs freely into the mold and a more perfect product is obtained. No fluxes whatever are used. A minute quantity of aluminium, never exceeding 1 per cent., is said to have the desired influence, while even a much smaller percentage may be advantageously used.

A soaking-pit for treating steel ingots has been patented in the United States and in the principal foreign countries by J. Riley, of Glasgow, Scotland. In treating ingots in a soaking-pit the latter is covered air-tight as soon as the ingot has been introduced. The ingot is then allowed to stand and soak until it assumes throughout a suitable temperature for being rolled or otherwise pressed into a bloom. The difficulty experienced in this treatment is that the pit is apt to cool too much for the proper treatment of the ingot in works where the ingots are cast at long intervals, or where the casting takes place at some distance from the rolling mill. To remedy this difficulty ignited gas is applied to the pit at the times when the temperature would otherwise become too low. Instead of burning the gas in or introducing the ignited gas into the pits themselves and in contact with the ingots, passages or flues are formed in the walls of the soaking-pits. Ignited gas is passed through these flues, so as to maintain the walls of the pits at such temperature that heat will not be injuriously radiated from the ingots.

In manufacturing flanged castings, such as rails, a difficulty arises which is to prevent the casting from becoming crooked. This is caused from the fact that as the casting varies in thickness the flange will cool more quickly than the body. To overcome this difficulty, J. Sullivan, of Newton Upper Falls, Mass., suggests the following method: After the rail has been cast, and while it is yet hot, some of the sand is removed by a scraper from next the inner edge of the flange, thus leaving a free space. Into this space melted iron is poured against the flange, the molten iron imparting sufficient additional heat to the thinner parts of the casting to enable the latter to cool more slowly than they otherwise would. In this way the rail when cool and removed from the sand is said to be perfectly straight. The molten iron which is poured against the casting does not adhere to it, because the casting is so much cooler than the iron poured.

A wire-coating apparatus of novel construction has been patented by J. J Lee, of Worcester, Mass. The apparatus contains a forward acid tank, a coating tank above the furnace and a receiving reel. The coating tank contains the usual holding foot for keeping the wire in position as it is drawn forward. A box or receptacle arranged above the coating material in the tank holds the sand. At a short distance from the inner end of the box there is stretched across the coating tank a wiping rod or bar that removes the superfluous coating from the under side of the wire. Thus, before the wire enters the sand, it is in proper condition to receive the final wiping operation. The apparatus is said to coat the wire in a uniform and smooth manner.

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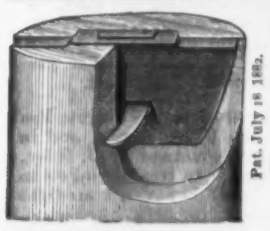

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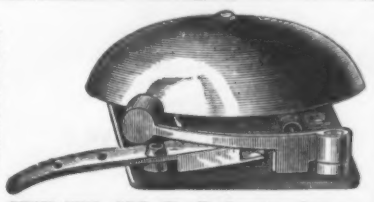

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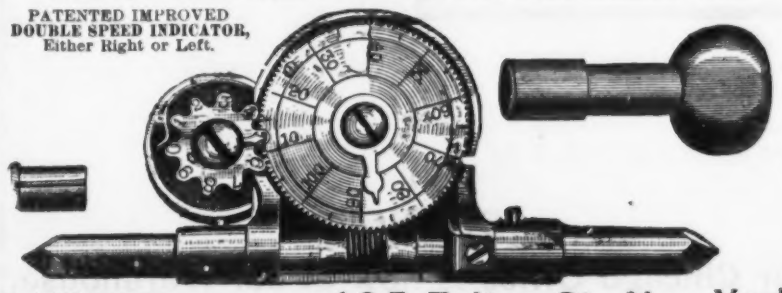

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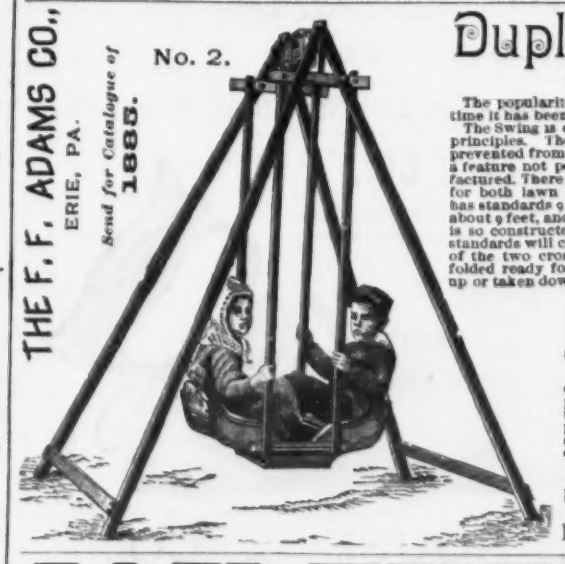

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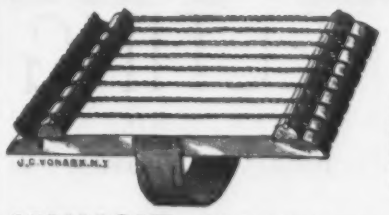

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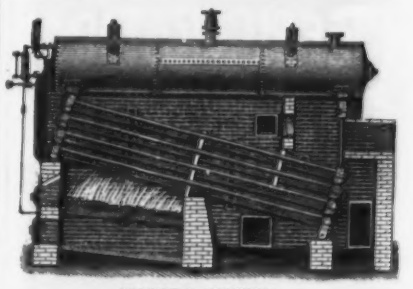

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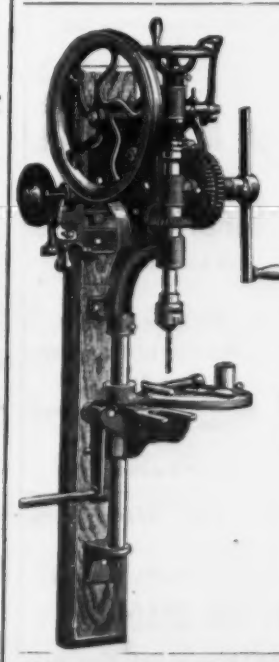

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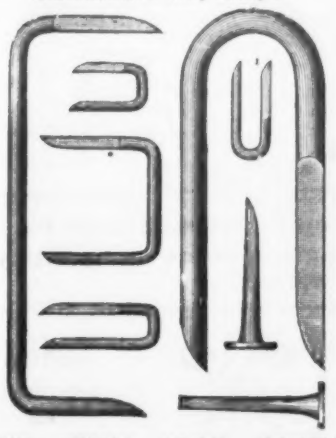

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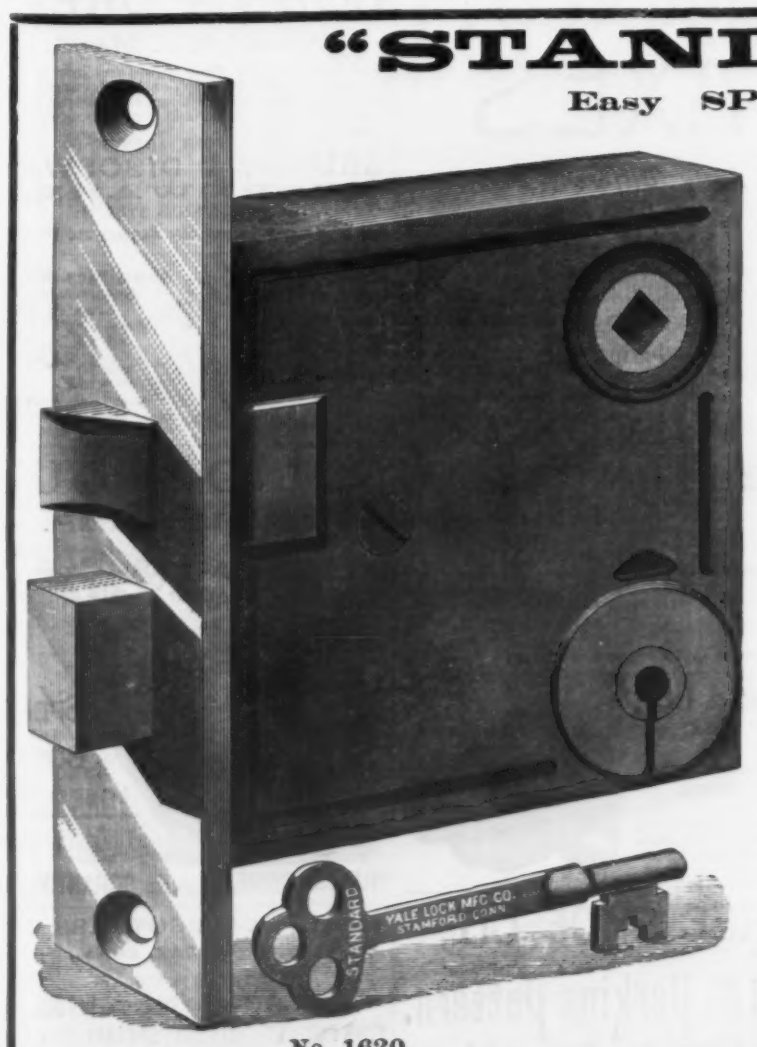

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English Letter.

(From Our Regular Correspondent.)

LONDON, FEBRUARY 8, 1886.

THE OUTLOOK

has not undergone the slightest improvement during the week, notwithstanding the fact that we are once more blessed with a ministry with Mr. Gladstone at its head. The termination of the political crisis, however, has been of no real benefit to trade and commerce, and there are no present symptoms of the ardently-longed for improvement. Complaints are rife on all sides as to the dullness of business, and there is a lively revival of the old complaints of the vigor and success of foreign competition. This latter complaint is always heard at a time when matters are bad, but there does seem some foundation for the statement that the Germans and Belgians are scoring in certain lines of iron, steel, nails and hardwares. Whether the aggregate amount of business they do in these things in England is or is not large I cannot say, but I do not think it is. On the other hand, there is no doubt that the Germans are doing well with India, China and the Australasian markets, as well as with certain parts of South America and the West Indies. The Germans, indeed, are likely to give your American exporters some trouble in Australia and New Zealand, where their agents are steadily pushing around and gradually building up valuable connections. They imitate not only your patterns (which might be borne), but also your labels, trademarks and packages, in the most faithful and resolute manner, so that if your axe, tool, "notions," &c., makers do not promptly wake up they will do so before long to find the major portion of their trade in these colonies altogether gone. In saying this I do not wish for a moment to libel such of the German houses as seek and take orders strictly on the merits of their own goods and marks, yet it is a fact which is well and widely known that at Barmlu, Elberfield, Solingen, Remscheid, &c., there are scores of makers of hardwares who spend all their time and energies in copying and counterfeiting the inventions and products of other men's brains and labor.

The bayonet scandal has not yet passed into oblivion. On the other hand, it has to day received a fresh impetus by the publication of the statement that Colonel Arbuthuat, chief of the Royal Small Arms Factory (Government), at Enfield, is about to proceed to Solingen to take over a further lot of sabers and sword bayonets from a leading firm at that German center. I have reason to know that this statement is founded on fact, although it is not wholly accurate, and, that being so, I anticipate a very considerable row both in and out of Parliament on the subject. English manufacturers have long been heartily sick of Government contracts, but they will certainly not stand the giving out of orders for inferior German sidearms and bayonets at a time when the trade of the country is in an almost unprecedentedly depressed condition. Had our own manufacturers been busy the shortcomings of the Ordnance Department might have been passed over, but not so at present, and, as I think, very properly, seeing that the honor and possibly the safety of the nation may depend upon the proper arming of our soldiers and sailors. No doubt the question of cheapness has led to the orders being sent to Germany, but, if so, such economy is false, and will be sternly condemned by the people of this country.

The extreme severity of the weather—which continues bitterly cold—has added greatly to the misery and sufferings of the unemployed in different parts of the country. There has been a great demonstration of the unemployed in London this afternoon, but the wind was so piercing that the muster was much smaller than had been anticipated. There are said to be some 70,000 men out of work in London alone, and no doubt elsewhere quite twice as many more. Public works are proposed to give them employment, but nothing definite has as yet been done. Lord Salisbury received a deputation the other day, and talked sympathetically to the men, in terms which might be readily interpreted as encouraging a policy of reciprocity or retaliatory tariffs. Sooner or later I suppose that is what we shall come to. Despite all this suffering the men in the North of England shipbuilding trade are still out on strike and have the cool effrontery to appeal to the public for funds to enable them to sustain their resistance. They ought to be forcibly expatriated, or, rather, all strikes and lockouts ought to be prohibited by law, the disputes to be compulsorily referred to fixed courts or arbitrators in each locality. The process of reducing wages is going on all over the country and is mostly being accomplished without strikes or violence, but here and there the men are manifesting pigheadedness and a very imperfect realization of the severity of the depression through which all classes of employers are passing.

BRITISH FURNACES IN BLAST.

Several of the trade papers here publish returns of the condition of the blast furnaces in Great Britain. Curiously enough, their figures are all different. Some of them are certainly erroneous, as I notice they include furnaces, to the number of between 20 and 30, which have been pulled down or dismantled for years past. Taking the statistics of the *Ironmonger* to be nearest the truth, we have the following results:

General Summary.

Total number of furnaces existing January 30, 1886	855
Total number furnaces idle January 30, 1886	439
Total number of furnaces in blast January 30, 1886	416
Total number of furnaces in course of erection January 30, 1886	6
Total number of furnaces on the ordinary pig iron of the various districts	330
Total number of furnaces making hematite pig iron	86
Total number of furnaces making spiegeleisen	8
Total number of furnaces making basic or silicious pig iron	2

The same paper makes an attempt to give the stocks on hand, but that is obviously somewhat difficult. From the remarks published, however, the stocks appear to be moderate, on the average.

THE IRON MARKET

has been very flat during the week, and almost entirely without feature. Scotch warrants have been unsteady, closing at 39/3 ₽ ton. Shipments have again been low, and much beneath the average. The advent of milder weather is desirable, and hopes are entertained that with the nearer approach of spring business in this department will be materially advanced. Stocks have again increased, and to a greater extent than might have been supposed, although, as remarked last week, the bad weather accounts in a measure for the increase. At Barrow and in West Cumberland no improvement is reported, nearly every department remaining almost precisely as last week. Mixed lots have realized from 43/ to 44/. In Cleveland an unrelieved dullness has prevailed throughout the week, nor has the publication of the returns for the two months ending December of the associated firms in connection with the Board of Arbitration exercised a good influence. It is shown, however, that although prices have been so low, the output has been in advance of the corresponding period of 1879. For prompt delivery sellers asked 31/, f.o b., for No. 3 Cleveland pig, but more or less small lots changed hands at 30/9 Cleveland warrants for No. 3 have realized 31/3, but transactions have been few and unimportant. Stocks, as in the case of Glasgow, have increased, and shipments have been comparatively small; but the weather is set down as the cause of it, as in the case of the Clyde. The continued idleness at several of the shipyards has operated prejudicially against the finished-iron works, and many of these latter are reduced to an uncertain and discouraging condition. Orders are not only scarce, but those that come to hand are small, and for the most part taken below the quoted prices, which are: plates, 90/; angles, 87/6, and bars, 92/6, f.o.b. at works, less 2½. In South Staffordshire no better condition, taken as a whole, can be reported. Business done has been limited, but prices have been for the most part sustained. The only departments in which any better demand has been experienced are boiler plates and best bars. Stamping sheets have held their own, and native pig may be said to have done the same, but only small parcels have changed hands, buyers evidently feeling that some further reductions are yet to come. Wire continues dull and without change, nor has any development been experienced in galvanized iron. The proposal of the Galvanizers' Association to enter into a combination to restrict output has not yet been acted upon. Consignments to the Australian colonies have lately been much reduced. F. Pitts & Co., London, quote: Old D. H. iron rails, 52/6 @ 54/; No. 1 heavy wrought scrap, 40/ @ 45/; old boiler tubes, 40/ @ 45/; old leaf-spring steel, 52/6, and old cast iron, 38/6 @ 40, all f.o.b. London or other good British port. Freights from Glasgow to New York remain steady, 7/6 @ 10/ being still quoted. To Melbourne 17/6 is the rate decreed by the "ring," but whether it will be continued to Sydney is not yet known. Steel has been without feature, orders being of such a character as to call for little comment. The Indian Government are contemplating placing several large orders for steel bridges in India. P. & W. Maclellan, Glasgow, have within the last few days taken a contract from the Indian Midland Railway Co. for a steel bridge to cross the River Yumna. Some little curiosity has been excited among the armor-plate makers as to the rumors that the Government of the United States have under serious consideration the building of a fleet of armor clads. Steel rails have been in very little demand this week, and no large order has either been placed or formed the subject of inquiry.

SCOTCH PIG IRON

is very dull, and there is really no animation in the trade, while the quotations for warrants are lower than have been known for a period of over 20 years. They are now, in fact, more nearly on their merits than they have been during all that long interval. There 94 furnaces in blast, against 93 a year ago. In Connal's stores there are 684,080 tons—an addition last week of 4364 tons—as against 580,876 tons this date 1885. Shipments to date are 11,654 tons behind, while the imports of Middlesboro' pig into Scotland are 15,744 tons behind. Current quotations:

Deliverable alongside.	No. 1	No. 3
Gartsherrie, at Glasgow	44/6	42/6
Coltness, "	48/	44/6
Langloan, "	46/	43/6
Summerlee, "	49/6	43/6
Calder, "	48/	42/6
Carnbroe, "	44/	41/6
Clyde, "	45/	41/
Monkland, "	40/6	38/
Quarter, "	40/	37/6
Govan, at Broomielaw	40/6	38/
Shotts, at Leith	46/	45/6
Carron, at Grangemouth	48/6	45/6
Kinneil, at Bo'ness	43/6	42/6
Glengarnock, at Ardrossan	44/6	41/6
Eglinton, "	40/6	37/6
Dalmellington, "	42/6	39/6

NORTHERN FINISHED-IRON TRADE.

The official return of Mr. Waterhouse, the sworn accountant, to the Northern Board of Arbitration, for the last two months of 1885, is couched in the following terms:

Gentlemen: Having collected from the firms and companies belonging to or associated for this purpose with your board the returns of their sales of manufactured iron during the two months ending December 31 last, and having verified the same by an examination of their books, I certify the average net selling price per ton to have been £4. 15/."

It is thus apparent that the decline in values has not yet been arrested, save in bars, which are 1/5 ₽ ton higher.

MIDDLESBORO' PIG IRON

is very flat and dull at the subjoined rates for G.M.B., f.o.b. at makers' wharves:

No 1	Foundry	34/	Mottled	30/3
" 2	"	33/	White	29/9
" 3	"	31/3 @ 31/6	Refined metal	47/6
" 4	"	31/	Kentledge	34/6
" 4	Forge	30/9	Cinder	30/

The official returns of the Cleveland Iron-Masters' Association for January show that the total make of pig iron of all kinds was 214,000 tons; the stocks were 573,820 tons and the shipments 47,671 tons. There was

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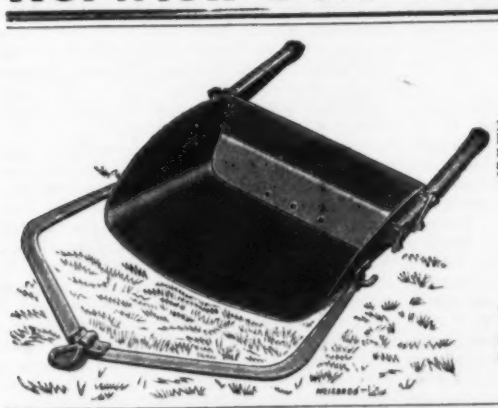

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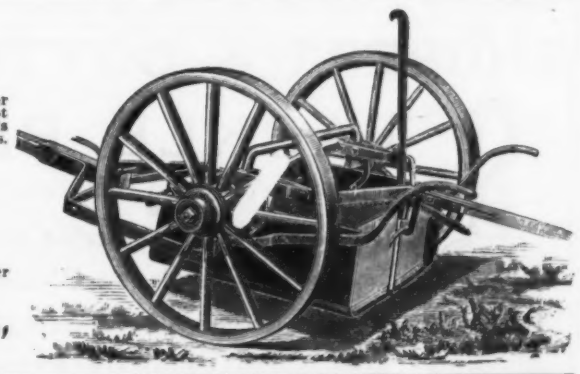

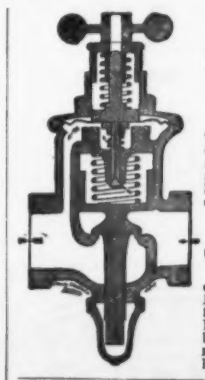

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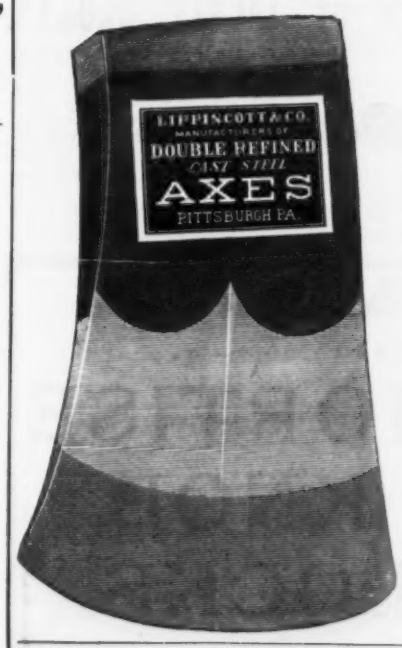

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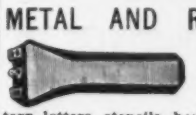

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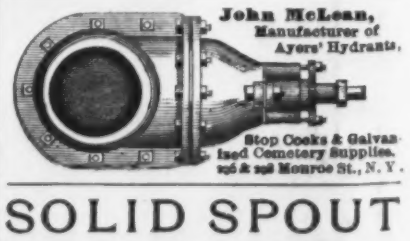

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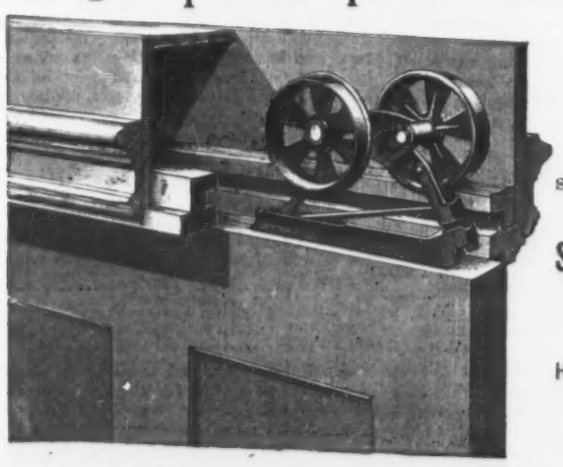

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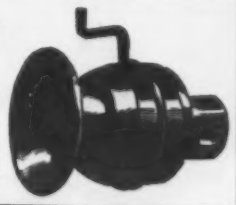

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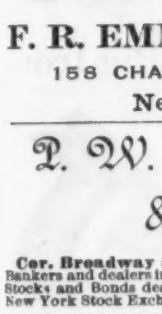

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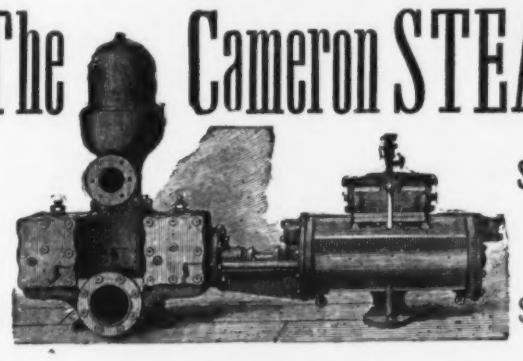

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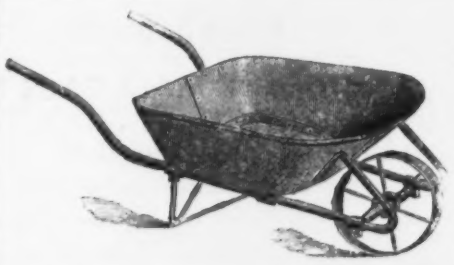

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HEMATITE PIG IRON

is quiet, but fairly steady, at 43/ ℔ ton for mixed numbers in usual proportions, while West Coast makers' brands are as below:

	No. 1.	No. 2.	No. 3
Cleator	45/6	45/	44/6
Lonsdale	45/	44/6	44/
West Cumberland	44/6	44/	43/6
Lowther	44/6	44/	43/6
Distington	44/6	44/	43/6
Harrington	45/6	44/6	43/6
Solway	44/6	44/	43/6
Maryport	44/6	44/	43/6

There are now 44 furnaces in blast on the West Coast, as against 46 a year ago. In the official store there are 100,955 tons, against 99,167 tons at the end of 1885.

Some fuss has been made of the introduction of Spanish hematite pigs into this country, but as your people had bought them long before I need not seek to enlighten your readers on a subject with which many of them are already acquainted.

THE BOARD OF TRADE RETURNS

for January are issued to-day. They show that our imports were of the total value of £28,933,039, as compared with £35,669,005 in January, 1885, or a decline of nearly £7,000,000 in one month. The aggregate value of the month's exports was £17,212,781, as against £18,109,525 in the same month of last year. The exports of iron and steel last month were 217,988 tons, valued at £1,606,448, as compared with £202,956 tons, and £1,572,178, in January, 1885, so that on this head there is a small but welcome increase.

TIN PLATES.

In London these have suffered a further drop in prices, and the position of affairs is certainly worse than it was a week ago. Buyers are practically out of the market at the present time, and, though some of the best makers are pretty well booked, other firms are pressing for orders in all directions. One concern have stopped this week and there are rumors of others probably following suit. I quote IC cokes 12/6 @ 13/, f.o.b. Liverpool. At Liverpool, though the tin-plate market is quiet, inquiries have been pretty numerous this week, and several orders have resulted therefrom. Buyers fear that there will soon be such enforced reduction in make by stoppages of many works that the aspect of affairs as regard prices will be completely changed, and the next move will then be most decidedly in an upward direction. Buyers have been brisk in taking an advantage of the late drop in prices, and have sent in a lot of orders for coke tins at 13/3 and 13/6, and Bessemer steel plates at 13/6, 13/9 and 14/ IC, ordinary and special kinds, What is aimed at chiefly now is to get ordinary good brands of coke tins in BV grade down to 13/3 and even 13/ IC A fair amount of business has come forward in Siemens steels with coke finish, but the prices are down to 14/ IC as a regular thing for ordinary kinds and 14/3 IC for specialties. Though there have been a few more inquiries for ternes, not much business resulted, as makers' quotations are rather above buyers' idea at present, and, there being no pressure for orders just yet, business has fallen through for the present. There is not much doing in charcoal tins and no change in prices.

THE HARDWARE TRADES.

In London there is little of an encouraging nature to report, for, although we have entered upon the second month of the year, business shows but faint signs of improvement. The opinion is expressed in certain well-informed quarters that matters will be worse before they are better. The future is now more than ever an unknown quantity, but if the tide of bad trade is soon to be turned it will probably be through China. The trade with Upper Burmah is taking a favorable turn, and already some very good orders have been placed for such commodities as galvanized iron for bazar constructions. The Australian mails show no improvement yet. New Zealand is not such a satisfactory customer as she was. India remains quiet. The home trade has, generally speaking, been very quiet since the turn of the year, but this week opened with a little activity among some of the city houses. At Birmingham the more settled aspect of political affairs, combined with the cheapness of money and the distribution of bank and other dividends, has imparted a more hopeful tone to the iron and hardware markets, without, as yet, however, sensibly affecting either prices or the volume of trade. There is more inquiry for metals, and consumption, more particularly of copper, is increasing, but the improvement is not yet sufficient to lift values. The shipping trade is reported backward, but home orders are now coming in pretty freely, both from factors' and manufacturers' travelers. At Sheffield, as fresh batches of travelers go forth and the ground is more minutely traversed, it becomes more evident that the home trade is greatly wanting in elasticity and strength. Representatives of the electroplate trade are by this time well on the road, and they confirm the reports current in other branches as to the difficulty of making up respectable order sheets. There is nothing new to report of the export markets. There remains a better demand from American buyers, both in the States and in the Southern Republics. Cane knives, butchers' knives, common table cutlery and agricultural tools are being more frequently sent to Brazil and the Argentine Republic than was the case six months ago, but each mail brings evidence of the efforts which are being made by American and German firms to eject English goods from the field in these particular articles. Canadian orders have not so far increased in sympathy with those of the States, but the time is at hand when the annual indents for sleighshoe and other steels are distributed, and with them some miscellaneous lines may be forthcoming.

The strongest wood in the United States, according to Professor Sargent, is that of the nutmeg hickory of the Arkansas region, and the weakest the West Indian birch. The most elastic is the tamarack, the white or shell-bark hickory standing far below it. The least elastic and the lowest in specific gravity is the wood of the *ficus aurea*. The highest specific gravity, upon which in general depends value as fuel, is attained by the blue wood of Texas (*condalia obovata*).

Foreign Markets.

FRANCE.

PARIS, February 13, 1886.—*Metals*—Markets remain very dull. In spite of the efforts of producers, prices do not harden, and Merchant Bar is obtainable at 125 @ 127.50 francs. Meanwhile work is not plentiful, and the hopes based upon the prospects of large undertakings in the near future have prove to be unfounded. The Metropolitan road, of Paris, has not yet called for bids.—*Moniteur des Intérêts Matériels.*

BELGIUM.

BRUSSELS, February 13, 1886.—*Iron.*—The market remains very quiet, there being little confidence in the future. Luxembourg Foundry Pig is quoted 41 francs, and Forge, 39 francs. Best Charleroi Forge Pig is quoted 47 francs; Ordinary Forge, 44 francs, and Mottled, 40 francs. Bars are sold at 100 francs for No. 1, with concessions for export, No. 2 being 107.50 francs and No. 3 115 francs. There is little demand for Beams, and they could be easily purchased at 97.50 francs, and might only fetch 95 francs. Two thousand six hundred and twenty-five tons of Post Railroad Ties have been taken by the Angleur Co. at 119.50 francs; 2625 Braet Ties by Cockerill at 119 francs, and 525 tons of Bernard Ties by the Couillet Co. at 149.50 francs. The following figures show the imports and exports of Iron and Steel for Belgium:

Imports.

	1885. Tons.	1884. Tons.
Iron Ore	1,398,931	1,488,140
Steel Ingots	12	97
Steel Rails	422	790
Other Rolled Steel	2,976	3,793
Steel manufactures	461	558
Pig Iron	100,788	125,619
Scrap Iron	17,799	13,869
Iron Wire	4,064	4,043
Iron Rails	136	763
Plates and Sheets	851	880
Other Rolled Iron	5,350	6,505
Nails	434	370
Manufactures of Iron	3,751	2,705
Castings	549	912

Exports.

	1885. Tons.	1884. Tons.
Iron Ore	156,550	190,988
Steel Ingots	868	482
Steel Rails	56,833	64,651
Other Rolled Steel	10,906	9,801
Manufactures of Steel	1,913	2,427
Pig Iron	10,667	10,665
Scrap Iron	7,851	11,118
Iron Wire	2,094	2,242
Iron Rails	10,181	19,742
Plates and Sheets	32,022	38,516
Other Rolled Iron	247,581	222,611
Nails	7,588	6,897
Manufactures of Iron	23,093	21,670
Castings	19,408	12,253

—*Moniteur Industriel.*

GERMANY.

According to statistics compiled by the Association of German Ironmasters, the output of the German blast furnaces was in 1885 as follows, the unit being the metric ton:

	Tons.
Mill Iron	2,018,718
Spiegeleisen	145,079
Bessemer Pig	472,468
Basic pig	668,065
Foundry Pig	447,445
Total 1885	3,751,775

For a series of years the figures are as follows: those from 1879 to 1884, both inclusive, being the official data compiled by the Government. They include from 16,000 to 17,000 tons of Scrap obtained in blast furnaces, casting-houses and from the washing of cinder:

	Mill pig.	Bessemer, basic and spiegel.	F'ndry.	Total.
1879	1,592,814	461,253	161,696	2,226,587
1880	1,732,750	731,538	248,302	2,729,038
1881	1,728,952	896,750	281,613	2,914,009
1882	1,901,541	1,153,093	309,346	3,380,806
1883	2,002,195	1,072,357	379,643	3,469,719
1884	1,960 438	1,210,353	414,528	3,600,612
1885	2,018,718	1,285,612	447,445	3,751,775

Germany has therefore made progress in the manufacture of Pig Iron in spite of the severe depression of 1885. In the Rhenish-Westphalian district Spiegeleisen and Mill Pig still occupy an exceptional position, in that their prices are firm, the former being maintained by a fair export demand and by the formation of the pool among producers. Few contracts for delivery of Mill Iron for the second quarter have been reported as yet, the rolling mills buying only for early requirements. Still it is known that a number of furnaces will blow out, so that Mill Pig is likely to become scarce during the second quarter of the year. Foundry Irons are weak on account of the lack of business reported by founders. Recent quotations are 47 @ 49 marks for 10 to 12 % Spiegel; special grades of Mill Iron, 41 50 @ 42.50 marks, with concessions for large lines; ordinary Westphalian Forge, 39 @ 40 marks; Foundry No. 1, 55 @ 56 marks; No. 2, 51 @ 52, and No. 3, 47 @ 49 marks. Westphalian Bessemer is 42 @ 43 marks at furnace. Bar Iron is weak in spite of occasional contracts, and Beams are offered at exceptionally low rates without leading to active business. The larger numbers of Wire Rods show a declining tendency in spite of the combination and a fair number of orders on the books of the mills. Railroad Ties have declined, the last contracts at Elberfeld being based on 121.80 @ 122 marks as compared with 127 marks for former orders. Silesia quotes Common Spelter 28 @ 28.40 marks; Selected, 28.60 @ 29 marks; Ordinary Gauges Sheet Zinc, 32 @ 34 marks, and Pig Lead, 22 @ 23.50 marks.

SPAIN.

According to official returns the exports from Spain during the first 11 months of 1885 were as follows, as compared with 1884, the unit being the metric ton:

Exports from Spain for 11 Months.

	1883.	1884.	1885.
Blende	14,482	7,430	1,970
Calamine	28,429	27,277	32,485
Pyrites	521,000	558,146	726,424
Iron Ore	3,952,546	3,656,235	3,546,882
Copper Precipitate and Matte	21,192	16,672	24,962
Quicksilver	515	1,189	1,011
Lead, Base Bullion	44,849	48,423	48,700
Refined Lead	71,260	59,743	59,305

Except in Copper Pyrites and Precipitate there is very little change as compared with the figures for 1884.

EAST INDIES.

SINGAPORE, January 4, 1886.—*Tin.*—The market has continued lightly supplied, and prices have been fairly steady. About 100 tons have changed hands at from $32.12½ to $32.50 ℔ picul, value today being $32 ℔ picul. Exports from the Straits to the United States for 1885 of Tin, 42,727 piculs.—*Gilfillan, Wood & Co.*

The Hudson River ice harvest has closed, and the statements collected from all points show that the amount stored is 2,003,000 tons, and, in addition to this, 104,500 tons have been stacked at different places, making the total harvest for the season 2,107,500 tons. As a rule one-third of the amount harvested wastes before it reaches the scales in New York. The cost of loading the ice on barges will average 12 cents a ton. The average price received for the ice delivered in New York by wholesale is from $2 to $3 a ton, and the average retail price is from $3 to $7 a ton. It costs about 20 cents a ton to tow the ice to New York.

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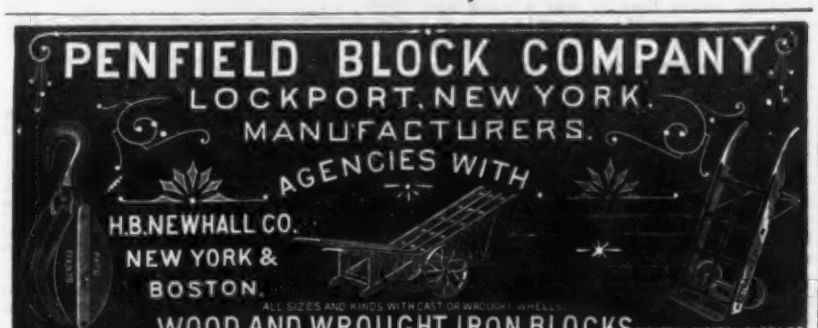

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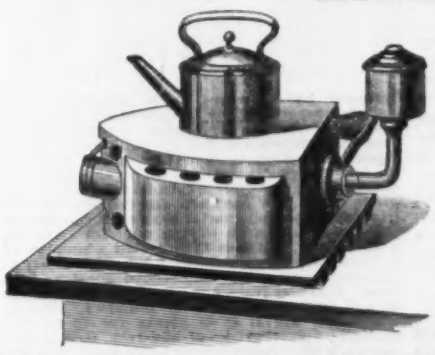

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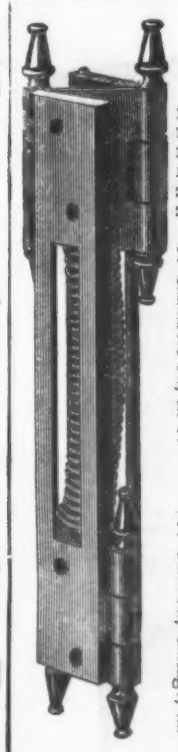

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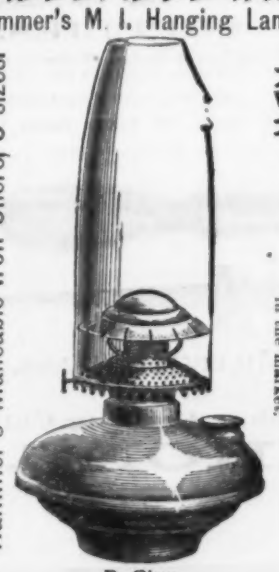

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The Great Cranberry Iron-Ore Quarry.

It is hardly a proper term to call the present workings on the large deposit of magnetic iron ore at Cranberry, N. C., a mine. While in the past two tunnels were driven, as much for proving the quantity of ore as for any other purpose, yet the present workings are on a large open cut, and the ore is quarried out like so much marble or granite—in fact, more like the rough work in a railroad cut. The Cranberry magnetic ore is one of the most noted bodies of that ore. It was known for many years before there was any possibility of reaching it except by the roughest of wagon roads. The original forge was erected before 1812, and the anvil-block and hammer first were packed over the mountain from Virginia on horseback. In excavating for the last forge the foundation timbers of this old anvil-block were dug out, 5 feet under ground, perfectly sound. The iron made was famous throughout the South, and brought a higher price than any from the adjoining counties of Carter and Johnson, in Tennessee, which irons were made from limonite, except at Hampton, and had a high reputation.

The belt of ore commences, as far as at present explored, in the northeast end of Mitchell County, and extends in a general direction north 75° east for about 15 miles into Carter County, Tenn. Like all the veins of the Alleghany Mountains, it is lenticular, having large bodies of ore connected by a comparatively narrow vein. These large bodies vary in their distance apart from ½ to 2 miles; the vein between is usually 4 to 5 feet thick. A similar ore is known to exist in Watauga County, N. C., to the east, and also in Ashe County, N. C., but no exploration has as yet connected them with Cranberry. Those bodies are at present far way from transportation, and are likely to remain so for many years to come. The ore as it exists at Cranberry outcrops on the west side of a small mountain in a great mass. Immediately at its foot is the valley in which runs Cranberry Creek, which furnished power for the old forge, and now drives the machinery of the small furnace. On the east side at the foot of a high mountain an opening was made which developed the ore at a thickness of 4 feet. No exploration has been made any further up the mountain. The ore lies between a wall of hard light gray gneiss, which decomposes on exposure to the atmosphere, which may be called the foot wall, and another body of dark-colored gneiss on the south constituting the hanging wall. The body of ore is frequently capped and intermingled with handsomely crystallized hornblende and epidote. Pyroxene and calcite are also abundant in the vein, and sometimes a few crystals of quartz occur. No apatite has ever been found, and no phosphorus at all, or only a bare trace. It belongs to the self-fluxing magnetites, and resembles very much the ore from Chateaugay, N. Y., having probably less silica than that ore. It is therefore, as is that ore, very near or quite the counterpart of the famous Dannemora ore of Sweden. I have not at hand now the analyses of the Dannemora and Chateaugay ores, as published in the "Proceedings" of the American Institute of Mining Engineers, but I give below a number of analyses of the Cranberry ore, and those members of the Institute who have, I think, Vol. XI, will find in a very able paper on "Furnace Experiments on Chateaugay Ores" the analyses for comparison. Five analyses of Cranberry ore gave:

Magnetic oxide of iron	94.37	91.45	85.59	80.77	91.89
Oxide of manganese	0.26	0.06	0.24	1.42	0.32
Alumina	0.42	0.77	0.11	0.52	1.03
Lime	0.43	1.01	0.72	....	1.06
Magnesia	0.36	0.58	0.33	....	0.23
Water	....	0.44	1.53	....	1.15
Silica, pyroxene	4.16	5.74	11.48	9.08	4.02
Sulphur	....	....	....	....	0.25
Phosphoric acid	....	....	....	....	trace
Metallic iron	68.84	66.22	61.98	59.49	66.53

These are undoubtedly choice specimens, as the run of the mine will give more lime, but in the deep workings as selected for shipment the ore is much improved in quality over that just obtained.

This property was bought in 1867 from Col. J. C. Hardin and others for $40,000, Gen. R. F. Hope, of North Carolina, acting for the purchasers. General Hope immediately erected a new forge and made a large quantity of hammered bar, which he took North to show the quality of the iron. Some of this was made into steel, and proved to be of the best quality. Finally the property was sold to Gen. A. Pardee and others, together with the charter and franchises of the East Tennessee, Virginia and North Carolina Railroad. This road was chartered in 1866 and 16 miles graded, of which 5 were laid with iron rails; it was then built with a 5-foot gauge. Defaulting in the interest on the bonds loaned by the State, it was sold and bought by General Jackson, Col. J. C Hardin and others for $25,000, and later sold with the mine to General Pardee and associates. The total price paid for mine and road is said to have been $150,000. These gentlemen decided to make it a narrow gauge, and, the charter having been so amended, they let it out by contract, and it was completed to Cranberry, 35 miles, in June, 1882, at a cost of about $800,000. This road connects with the East Tennessee, Virginia and Georgia Railroad at Johnson City, 25 miles south of Bristol, at which place are ample tracks and platforms for transferring ore. These gentlemen were not the first Northern capitalists to purchase ore land in this region. A large body near what is now Roan Mountain Station, on the Narrow Gauge, wherefrom the old Hampton Forge obtained its ore, was purchased as early as 1868 by some capitalists from Philadelphia, who bought coal lands in the Cumberland Mountains. The company were represented by Messrs. Sterling & Stiles, and they own a very valuable and extensive ore property. They also endeavored to buy the railroad, but it fell into the hands of General Pardee—fortunately, perhaps, for that section, as the Hampton company would probably not have built it further than their property. Their ore is from 4 to 5 miles from the railroad, the body of metamorphic rocks here commencing to turn more to the southwest. It has not been found in any large body beyond this locality. At the only place where I have seen it it was 3 feet thick.

Work was commenced on the Cranberry ore by driving in a tunnel at nearly right angles to the vein and about 75 feet below its nearest outcrop on the east slope of the ridge. This tunnel was driven in 325 feet, of which 50 feet were in the ore. It is 7 feet high and 14 feet wide, timbered for some distance in the very best style. A year later a tunnel was driven in directly on the northeast end of the outcrop where it comes out at the butt of the hill. This was in ore from the start, and is still in use. Tunnel No. 1 is not now in use, the greater part of the work being mere quarrying in the open air. This work was commenced on the east side of the outcrop, and is being pushed south across the vein. The south face of this quarry is about 150 feet long, and the highest wall of solid ore is 50 feet and the lowest about 25 feet. The floor of solid ore is from north to south about 50 feet to the bottom of the solid perpendicular wall stated. The pitch of the vein is here from 35° to 40° to the south-southeast, and the strike, as stated before, south 75° west. The ore body is here estimated to be fully 300 feet thick. In the main or No. 1 tunnel a diamond drill was run in 150 feet, and was all that distance in ore and did not go through. The ore is blasted down in large masses, which are again split up by blasts, then broken with sledge-hammers. The ore is dumped through a shaft to the level of Tunnel No. 1, and then run by tram-road to the docks, to be sorted and loaded into the railroad cars for shipment. Up to January 1 the ore, by contract, cost the company on the cars 60 cents per ton, and it was sold, delivered on the cars of the East Tennessee, Virginia and Georgia Railroad at Johnson City, at $2.50 per ton. It undoubtedly does not now cost so much as 60 cents. Mr. Nimson, formerly of Allentown, is general manager of the whole business, and Mr. Al. Nimson is superintendent of the mines and furnaces.

The furnace is a small affair, run with charcoal, partly made in pits and part in conical kilns, and is run by water-power. The air is heated to about 400° to 500° in a small pipe hot-blast stove. It is built of fire-brick, banded, is 50 feet high, 10 feet bosh and 2 feet hearth, is calculated to average 7 tons and has made as high as 10 tons and as low as 3 tons per day. The make varies with the water supply. The pig is of the best character. When first ascertaining its quality large quantities of this ore were sent to Allentown and tested alone and mixed with limonite in the furnaces of the Messrs. Pardee. It worked well in either case. By contract 75 tons per day are now sent to the Crozer Steel and Iron Co., at Roanoke, Va. It is used there mixed with limonite. In first using it at Cranberry the usual quantity of lime was used and much trouble experienced. It is now used without any other lime than the calcite it contains in itself. The company own at Cranberry about 4000 acres of land, many houses and a well built Northern-style hotel at Johnson City; they own considerable land and a site for iron furnaces, which they intend to build as soon as good coke can be obtained at cheap rates. The total investment is said to be about $1,400,000. In this region is the only great body of steel-making ore in the South, and, as the supply is very large, it is destined to prove an important item in the future industries of the Southern States. H. E. C.

Lacquer-Work of the Burmans.—The Burmese lacquer-work is not unlike that of China and Japan, but is made exclusively of small bamboo strips. These later are woven into circular boxes of all sizes, from betel-pouches to house-trunks. The first step in the lacquering is to smear the box with a mud containing (or not, according to quality) a proportion of the black varnish called "*thittsee*," obtained from *melanorrhœa usitatissima*. Next follow sun-drying and polishing in a lathe with soft sandstone and water. A coat of the varnish, mixed with bone-ash, is then applied and rubbed down; another coat containing less bone-ash, and another rubbing down, succeed; then a final coat of varnish is polished, giving the box a smooth, brilliant, black surface. The pattern is put on in black and red. First, black lines are run round the box by a kind of style or point, fixed in a bit of wood or bamboo, so as to leave a slight projection, the point being charged with black varnish; on rotating the box in the lathe in contact with this style, the necessary black lines are produced in relief. These being completed, the box is entirely covered with a coating of red paint made from vermilion ground up in a vegetable oil (*shantsee*) so thick as to conceal all the black lines. This dry, a rubbing down with rice-husks and water in the lathe removes the red color from the prominent black lines. Any additional colors are successively applied and the pattern developed by a steel style pointed at one end and flattened at the other. The market value of the finished box depends on its elasticity and the fineness of the pattern.

A heating and melting furnace patented by F. James and C. M. Schwab, of Braddock, Pa., operates as follows: The material to be heated or melted is placed on the hearth and gas is introduced. An air inlet being opened, the air rushes in, and, passing down through the brick checker-work of one chimney, mingles with the gas. Combustion thus takes place, and the flame and products of combustion pass along the hearth and out of the top of a second chimney, heating the checker-work therein contained. The checker-work having been heated in one of the chimneys, the furnace is reversed by closing one and operating another air inlet. It will thus be seen that combustion will take place at opposite sides of the furnace, and that one of the chimneys will always be used for the exit of the products of combustion, so that when the checker-work in one of the chimneys becomes heated the air is allowed to pass through that side, so as to become heated before mingling with the gas. In this way the place of combustion can be reversed from one side of the furnace to the other at will, and as often as necessary.

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The Production and Consumption of Rails.

Of all the branches in the iron trade the manufacture of rails is the heaviest as a single department. It may be asserted that, making a reasonable allowance for waste, the product of the year 1885 alone called for 1,300,000 net tons of pig iron. That is equivalent to nearly 29 per cent. of the total output, or almost 32 per cent. of the production of our coke and anthracite furnaces. Although the railroads as consumers make their influence felt through a thousand channels in every department of the iron trade, there is not a single one in which that influence can be traced so directly. It is a fact, too, that the rail business is the first to suffer when the railroads are poor, and the first to feel the quickening impulses of heavier purchases. We have, as they developed, discussed from time to time the features affecting the business. Now that we have the data relating to the production of 1885, we may turn to the question of the consumption in the past and the prospects for the future.

The demand for rails comes from two sources—for new construction and for renewals. A very fair approximation to the former may be estimated from the careful compilations of new mileage added annually to the network of railroads in the country. There are, however, some difficulties to contend with which render accurate statements of consumption for this purpose impossible. The quantity of rails required per mile of track varies within very wide limits. It is only 61.5 short tons for narrow-gauge and as high as 99 tons for standard roads. Besides this, the weight of the rails used is much greater to day than it was 10 years ago. It may be assumed that in 1867 the average was 90 tons per mile, gradually increasing until it is now 95 tons per mile. Another point to be considered is the mileage of second track, sidings, &c. It, too, has steadily increased. From present statistics it would appear that the accessory tracks add as much as 23 per cent. to the length of road in the United States, and therefore at least 20 per cent. may be added to the number of miles of new road built every year to get at the actual mileage of track laid. Thus a series of figures is obtained on the basis of the number of miles of railroad constructed annually, from which a fair estimate of the quantity of rails used for this purpose may be deduced. On the other hand, we know from the statistics of production of iron and steel rails, carefully collected annually by the Iron and Steel Association, and from the imports of rails, how large the apparent consumption was every year. This, of course, neglects the stocks in makers', consumers' and importers' hands, which, however, in the case of rails are a less important matter than in the majority of other commodities. The difference between this apparent total consumption and the quantities used for new mileage would fairly represent the consumption for renewals. The following table has been computed in the manner indicated:

Year.	Inc. of mileage.	Total consumption.	New roads.	Renewals.
1867.....	2,449	627,157	279,200	347,957
1868	2,979	756,795	339,600	417,195
1869	4,615	906,749	504,000	402,749
1870.....	6,070	1,019,153	663,000	356,153
1871.....	7,379	1,341,484	814,800	526,684
1872.....	5,878	1,73 ,850	648,600	881,950
1873.....	4,107	1,148,849	453,400	695,449
1874.....	2,105	837,724	234,900	602,824
1875.....	1,712	810,770	191,000	619,770
1876.....	2,712	879,916	302,600	577,316
1877.....	2,281	764,744	257,300	507,444
1878.....	2,687	882,695	303,000	579,695
1879.....	4,721	1,157,420	532,500	624,920
1880.....	7,174	1,752,526	817,800	934,726
1881.....	9,789	2,230,421	1,116,000	1,114,421
1882.....	11,591	1,912,921	1,321,000	591,921
1883.....	6,755	1,399,671	770,100	629,571
1884	3,977	1,144,850	423,378	691,472
1885.....	3,110	1,090,698	354,540	736,158

Repeating former comments on this table, it will be noted that in a general way the quantities for renewals fluctuate far less violently than do the amounts used for the construction of new roads. The figures for the latter lap over, of course, from year to year—that is to say, a considerable proportion of the rails produced in one year are in reality for consumption in the next, and the variations from year to year, therefore, appear more violent than they probably are. This partly explains such apparent anomalies as are exhibited by the fact that, although the mileage of new roads built in 1882 was much larger than it was in 1881, the consumption of rails shows a heavy decline. Of course, being deducted from the tonnage for new road-bed, the requirements for renewals are in a similar manner less subject to sudden variations than indicated in the table. With such variations growing out of the necessary intervals of time between the manufacture and the laying down in the tracks, the table given illustrates some important general truths. It shows that our rail mills can depend upon a certain quantity of work annually, say from 600,000 to 700,000 tons, for renewals. It is well known, and this fact is brought out clearly in our estimates, that the requirements for this purpose will be withheld for years, and then may come with a rush which stimulates booms. The accumulated demand, it may be noted, is the first to make its appearance. This is only natural. One or two years of prosperity to the railroads induce their officers to make repairs long deferred; then, flush times continuing, comes the craze for feeders and branch lines, followed by the wild scramble into new enterprises by the general public. The period of 1880 to 1882 witnessed a movement of this kind, which was probably exaggerated by quite a widespread replacement of old, worn-out iron track by steel. The drop in the quantity to the normal needs, or probably less than normal needs, in 1882 shows how that movement had spent its force while the other was still working toward its climax.

Turning now to the current year, let it be assumed that at least 700,000 tons will be required for renewal. Our well-informed contemporary, the *Railroad Gazette*, in discussing this subject, states: "The renewal of one-fourth of the iron track which is more than 10 years old will require something like 615,000 tons of rails per year, and this would seem to be a moderate requirement; for, though the iron rails are almost exclusively on roads of thin traffic, they are not to any great extent on the roads in new country, having been laid for the most part more than 10 years ago, and of course not all, by any means, on new road then." We may add that, in addition to iron track, a good deal of the railroads equipped with steel need renewal, and an estimate of 700,000 tons is therefore a conservative one.

Where the greatest uncertainty exists is in the matter of new mileage. It is estimated generally that 6000 miles will be built, and there are those who predict that we will in 1885 extend our railway system by 9000 miles. Even if it is not more than 5000 miles, that would call for at least 550,000 tons of rails, carrying the total requirements to 1,250,000, or dangerously near the capacity of our rail mills, which may be rated at 1,400,000 to 1,500,000 net tons. Any exceptional activity in renewals or in new construction would crowd them to their utmost capacity. To date 800,000 gross tons or nearly 900,000 net tons of rails have been contracted for, with a number of important roads yet to hear from. Statistically, therefore, the position of the rail mills is an excellent one.

The late Antwerp Exhibition has evidently furnished ample food for serious thought among English engine-builders, the subject of relative cost of accurate and inaccurate workmanship having been presented to them in a decidedly unpleasant way. Continental, and notably French and Belgian, firms have demonstrated in a most striking manner that excellence of design, of material and of workmanship are things to which they have given a good deal of attention in building their engines. As English engineers seem to have been rather too economical to satisfy these requirements, comparisons of their work with that of others have given results decidedly detrimental to the reputation of the English builder. International exhibitions afford peculiarly favorable opportunities for such comparisons, and the Antwerp show certainly constituted no exception. There is every indication, however, that the results thus obtained were genuine surprises to many English manufacturers, and that nothing short of personal examination sufficed to convince them of the necessity of radical reform in order to maintain their boasted reputation for good and thoroughly reliable work. One English paper describes the situation very graphically by saying that "there is a great number of firms turning out steam machinery which is not very good, while a few firms make engines which are very bad indeed. Their excuse is to be found in their ignorance. They really do not know how to set about making a good engine, and they waste large sums annually simply because they are ignorant." This plea for the honesty of the builder does not fully cover the case, however, and ignorance alone cannot be held to account for the slipshod manner in which engines are fitted. There is evidently among some English builders a mistaken notion as to profitable methods of manufacture, which calls for prompt action. Under the prevailing circumstances any examination as to the comparative accuracy of British and French, Belgian or German workmanship will place the first in a most unfavorable light.

Our Imports and the Duties Collected Thereon.

The Bureau of Statistics has issued a statement showing the value of the imports of merchandise imported for a series of fiscal years. For the last ten years the figures have been:

Fiscal years.	Value of merchandise free of duty.	Value of dutiable merchandise.	Total duty collected.
1875.....$146,4[illegible],463		$379,795,113	$154,584,983
1876....	140,561,381	324,024,926	145,178,603
1877.....	140,840,149	298,989,240	1[illegible]8,428,343
1878	141,339,059	297,083,409	127,195,159
1879.....	142,550,159	296,742,215	133,396,436
1880.....	208,049,180	419,506,091	182,747,654
1881.....	202,557 412	448,061,588	193,800,880
1882.....	210,721 981	505 491,967	216 138,916
1883.....	206 913,289	493 916,384	210,6[illegible]7,293
1884.....	211,280 265	456,295,124	190 282,836
1885.....	192,912,234	386,667,820	178,151,601

It will be noted that there has been a heavy falling off in the quantity of dutiable merchandise brought in from foreign countries, while the value of the goods in the free list has shown comparatively little variation since 1880. In the duties collected are included sums less than $1,000,000 of discriminating duties collected on free merchandise.

The revenue derived from different classes of commodities is shown in the following table for the fiscal years 1884 and 1885, with the amounts of duty collected:

Imports of Commodities and Duties Collected in 1884 and 1885.

		Imports.	Duty.
Breadstuffs and other farinaceous food	1884...	$6,229,665	$907,125
	1885...	6,584,752	1,030,556
Chemicals, drugs, dyes and medicines	1884...	13,089,656	3,716,490
	1885...	11,699,594	3,795,583
Manufactures of cotton	1884 ..	28,638,479	11,479,942
	1885...	27,242,512	10,932,346
Earthen, stone and china ware and bricks and tiles	1884...	4,618,607	2,570,507
	1885...	4,843,106	2,731,655
Fancy articles, perfumery, &c	1884...	8,052,914	2,808,444
	1885...	5,449,375	2,079,902
Flax, hemp, jute and mfrs. of	1884...	33,814,271	9,418,484
	1885...	32,686,418	9,069,756
Fruits, including nuts	1884...	16,500,859	4,430,556
	1885...	13,005,595	3,672,293
Glass and manufactures of	1884...	7,553,185	4,206,638
	1885...	6,340,721	5,714,068
Iron and steel and manufactures of	1884...	42,917,747	14,799,117
	1885...	33,903,258	11,973,908
Leather and manufactures of	1884...	11,362,891	3,178,854
	1885...	10,262,615	2,869,224
Silk and manufactures of	1884 ..	38,030,374	18,962,210
	1885...	28,106,798	14,000,210
Spirits and wines	1884...	6,792,109	5,730,646
	1885...	8,214,341	6,609,565
Sugar, melada, molasses, &c	1884...	94,302,570	48,923,465
	1885...	73,517,063	52,184,744
Tobacco and manufactures of	1884...	8,697,751	6,945,652
	1885...	9,121,869	7,356,369
Wool and manufactures of	1884...	55,078,171	32,001,226
	1885...	45,650,969	27,459,235

There has been a decline for nearly all the articles enumerated, with the exception of sugar, which yields nearly one third of the entire revenue from customs. Iron and steel next to silk contribute the heaviest sum. Until 1884 tin plates, sheets, terne tin and galvanized tin plates were classified separately. Adding these, we reach the following totals for a series of years:

Fiscal years.	Values.	Duty.
1874.....	$48,111,476	$12,942,053
1875.....	33,119,060	8,849,002
1876.....	23,145,260	6,353,979
1877.....	20,382,434	6,226,438
1878.....	18,480,978	5,970,290
1879.....	19,996,369	6,766,143
1880.....	62,047,083	23,275,508
1881.....	66,304,721	25,657,224
1882.....	70,632,276	29,097,586
1883.....	57,634,698	21,693,556
1884.....	42,9[illegible],472	14,847,244
1885.....	33,955,106	12,046,826

In 1885, therefore, the imports had dropped back to the figures of 1875, after the great development incident to the boom period. While, however, 10 years ago, tin plates figured as a little more than one-third of the total, they are now nearly one-half. The following table, giving the imports of tin plates for a series of years, will illustrate this clearly:

Fiscal years.	Values.	Duty.
1874.....	$13,402,128	$2,021,652
1875...	12,634,816	2,084,842
1876.....	10,273,875	2,192,089
1877.....	9,860,214	2,461,092
1878 ..	9,952,434	2,689,642
1879...	10,302,004	3,083,349
1880.....	16,580,097	4,094,883
1881.....	14,714,147	4,194,690
1882.....	16,634,009	4,922,039
1883	16,797,322	5,075,052
1884.....	18,182,637	.....
1885....	16,665,739	.....

For the last two years the duties collected on tin plates are not specified, but they were probably in excess of $5,000,000.

While the amounts of duty collected declined from $216,138,916 in 1882 to $178,151,601 in the fiscal year 1885, the receipts from internal revenue dropped from $147,093,383 to $112,421,121 in the same period, thus showing a decline in the increase of the Government from these two sources of $71,759,577.

The Coke and Nail Strikes.

Within the past week the situation of affairs in connection with the coke and nail strikes in the Connellsville region and in the nail mills of the West has assumed a very different aspect. A little more than a week ago, so far as could be judged by actual appearances, the outlook was by no means favorable to labor. To-day the latter has won in the coke regions, and the prospects of a compromise in the nail strike are by no means remote. As we have indicated before, the coke operators were by no means averse to granting the workmen what they demanded, the rates ruling in December, 1884, when the last reduction was made, provided that there was coupled with this return to former wages a corresponding advance in the price of coke. The syndicate, however, did not regard the present as an opportune time for this advance, especially in view of the fact that many yearly contracts for coke did not expire until April. Therefore they declined at first to grant the demand. Last week, however, the price of blast-furnace coke was advanced to $1.35 a ton from $1.20, f.o.b. at ovens, and the rates asked by the men were conceded. Mining is advanced from 27 cents a wagon of 30 bushels to 30 cents: drawing ovens from 55 cents to 60, and leveling ovens from 8 cents to 10 cents. The questions as to company stores and false weights at most works are relegated to the future, though some miners refuse to resume work until these questions also are settled. The Hungarians who began the strike, and whose course has been marked by violence, as the result of which quite a number are now under arrest, also refuse to resume work or allow others to take their places until the imprisoned Huns are released. It is believed that these men have shown themselves so undesirable as workmen that their services will be dispensed with in the future. There is still, therefore, some little trouble in this region, but the strike is practically at an end.

In the nail mills the prospects for a compromise have been increased by the action of the Junction Works, at Mingo, Ohio. This mill has been connected with the Western Nail Association, and had been a party to all its determinations. It had, however, made no attempt to run with feeder nailers, and therefore had not this complication. It is understood that its representative at the meetings of the association had objected to the amount of the reduction demanded, and was in favor of meeting with the nailers in conference and endeavoring to settle the contest. The refusal of the Nail Association to meet the nailers' committee except on conditions which the nailers declined precipitated matters, and late last week the Junction Co. signed a compromise scale at 19 cents, instead of 17 cents, and 10 per cent. reduction when self-feeders were used, instead of 25 per cent The Western Nail Association promptly held a special meeting, expelled the Junction Iron Co., and reaffirmed their previous position. In spite of this action it may be said that the indications favor a speedy compromise. Other mills are not anxious for the reduction from 21 cents to 17 cents, believing it too great, even though they also believe that 17 cents should be the price for cutting, in view of the rates ruling in the East. The spring trade is so near at hand that whatever is done will be done soon.

Financial circles have been treated to a surprise during the past week which bears directly upon the question of the fuel supply of the Eastern States, discussed in our last issue. Then it was generally believed that, while many obstacles would be encountered by the syndicate formed to reorganize the Reading Railroad, its plans, or those of pools having the same object in view, would ultimately prevail. Now the entire situation is changed through the success achieved by Mr. Franklin B. Gowen. So far as is now known, Mr. Gowen has succeeded in obtaining the backing of the Vanderbilt holding in Reading stock, and in procuring financial aid to pay past due obligations. What the result of this movement will be from a railroad point of view is a matter which does not directly concern us, and the many speculations as to its effect in this direction may be passed over in silence. To the consumers of coal the changed aspect of affairs is not without much significance. Mr. Gowen's well-known hostility to the Pennsylvania Railroad is a factor which needs careful attention. His accession to power will mean two things—a contest with the rival corporation, and an effort to secure recognition for the Reading Railroad for a larger percentage of the anthracite tonnage. So far as the former is concerned, it may be stated at once that it is likely that the Pennsylvania will keep aloof from any combinations, and may elect to carry the war into Africa through its Pottsville line. So far as the attitude of the Reading Railroad toward the other coal carriers is involved, it is a point frequently urged in its behalf that its distressed position has for years been taken advantage of to extort concessions, and that it has not occupied in the councils of the trade the commanding position to which its facilities, natural advantages and possession of territory entitle it. It is likely that an effort will be made to provide for a plan of restriction, irrespective of the Pennsylvania Railroad, as has been done in the past, with the result of averting a disastrous struggle. Mr. Gowen was credited not long since with the statement that his policy, so far as the iron industry is concerned, would be to aid it by granting low prices. If he has been truly reported, those engaged in that industry will welcome his return to the management of the great corporation for whose present position he is chiefly responsible. It is certain that the events of the past week have utterly destroyed what prospect there was of a great combination to carry the price of anthracite coal to higher figures. It was based upon harmony among all the interests, and then the principal limitation to its success was the competition of soft coal. Now the additional obstacle to a reign of high prices, irrespective of the supply and demand, is the probability of independent action on the part of at least one very important interest.

Binary Vapor Engines.

Referring to the articles on triple-expansion engines which appeared in our columns a short time ago, and in which the subject of steam economy was brought forward prominently, a Western correspondent writes us at some length directing attention to the different sources of loss in the steam engine, and offering a suggestion as to the best means of increasing its efficiency. "If in a condensing engine," he remarks, among other things, "instead of the water used to absorb the latent heat of the escaping steam should be substituted certain liquids which, when having absorbed sufficient heat from the steam to reduce it to water, would themselves become vapors, exerting a greater pressure than did the original steam on entering the engine, these vapors could be conducted to a second or even third engine and converted into work, as is done with the steam in the first place." Evidently our correspondent is not aware of the fact that others before him have labored in this field of investigation, and that what he suggests is nothing more nor less than the use of the binary vapor engine, first brought out years ago by M. Prospère Vincent du Trembley, and fully described by him in a work entitled "Manuel du Conducteur des Machines à Vapeurs Combinées ou Machines Binaires." This form of engine, as is well known, has been very popular with inventors, bisulphide of carbon, which among others is given in a list of proposed highly volatile liquids in the letter before us, having been the liquid ordinarily employed. Naturally, the use of the second engine was found to generally increase the economy, since the effect was to increase the range of temperature through which the engine worked; but the same amount of additional energy obtained by the use of the bisulphide of carbon or other engine with the steam engine could obviously also be obtained by continuing the expansion of the steam sufficiently far.

Taking all points into consideration, therefore, there being many practical objections to the binary vapor engine, it is safe to say that it possesses no advantage, theoretical or practical, that cannot be obtained by the use of a single fluid with less complication and expense. Many engines of this kind have been brought to the notice of the public, but they have usually been short-lived and utterly worthless. One of the more recent exploits in the line of binary vapor engines consisted in using methyl alcohol, commonly known as "wood alcohol," directly with the water in the boilers, but in this case, as in all previous cases, experiments furnished absolutely discouraging figures. A two days' trial on a large scale with a 150-horse-power engine resulted in disappointment to those who expected to learn of an economy in fuel, and removed all doubts as to the practical objections to the system.

While practical development in the matter of forced draft for steam boilers has shown that its advantage are of the utmost importance, and in many respects unmistakable, the complete success of a forced combustion system in every detail has not yet been recorded. From what has thus far been accomplished it has been difficult to prove that working with a forced draft can be economical, and as the whole question, so far as a general use of the system is concerned, is one of money, a definite statement of the pecuniary results of its application would be received with not a little interest. This necessarily calls for a practical demonstration in which first cost, wear and tear of the apparatus—in short, all items likely to affect the final result—are carefully taken into account. In special cases, as on ships of war, where in an emergency fuel economy may profitably be sacrificed to increased boiler efficiency, the value of forced draft is, we think, beyond question, and were it not for the requirements of

ordinary every-day working the question as to the comparative merits of forced and natural drafts might be regarded as settled. It has been well stated that with the former the fire becomes intensely hot, the chances of combustion to carbonic oxide, instead of carbonic acid, are diminished, more of the heat appears in the radiant form, and that the furnaces become more efficient. On the other hand, however, there are distinct sources of waste which cannot be overshadowed. Losses arise not only from the fact that large quantities of unburnt fuel are carried up the chimney, but also because the products of combustion are hurried along at such speed that no time is left for the water to absorb the heat from them. Burning of the fire-bars is another matter which has brought forced draft to unfavorable notice, and it is recorded in connection with a trial conducted some years ago with one of the British war ships that the run was brought to an abrupt conclusion by the melting of the cast-iron grate-bars. This difficulty, however, could be readily overcome, and would scarcely be of much avail in detracting from the merits of the system. Success hinges on the more important points which have not yet been finally disposed of, and concerning which we must look to further investigation for more definite information.

It is satisfactory to observe that in the more perfect organization of labor throughout the country there is a general disposition to disown and repudiate the socialistic element as being in the most literal sense the enemy of the workingman. The primary object is, the leaders say, to maintain wages. Frederick Werner, a prominent leader in Philadelphia, says: "We do not countenance the socialists, and whenever an agitator attempts to promulgate his views in any of our assemblies he is summarily sat down upon." J. H. Connors, a leader in New Orleans, is credited with the following statement: "It is the purpose of the central organization and the desire of the leaders in the various unions to settle all questions in dispute by arbitration, and not to order a strike except as a last resort." The chairman of the political branch of the State Workingmen's Assembly, John Franey, of Buffalo, says: "There is no affiliation between the Knights of Labor and the socialists. Socialists who may have crept into the Knights of Labor are not regarded with favor by the members of that organization, and are never advanced to positions of importance in the order." John Howes, of Massachusetts, district master workman of the Knights of Labor, said in a recent interview: "I see it has recently been charged in the public press and elsewhere that our organization is affiliated with the socialistic movement. Nothing can be further from the truth. The Knights of Labor have no connection whatever with socialists as an organization." Hugh T. McMurtry, of St. Louis, high in the councils of all labor organizations, referring to socialism, says: "We will allow no such ideas to get into our order." Opinions gathered from other sources among the Knights of Labor are almost identical.

Obituary.

THOMAS B. CODDINGTON.

Thomas B. Coddington died at his residence, No. 42 Fifth avenue, on Tuesday evening, after a short illness, in his 72d year. He was born in Perth Amboy, N. J., in 1814, and after receiving a liberal education he came to this city and went into the iron and metal business when he was 21 years old. Having a rare business capacity, energy and reputation of sterling integrity, his business prospered and rapidly extended, and he added the importation of metals to the domestic trade. He had several partners during his long business career, and finally founded the firm of T. B. Coddington & Co., with G. L. Jewett and H. V. B. Nash as his associates, and has been for many years in business in Cliff street. He remained active in business affairs to the time of his illness. He was philanthropic, connected with a number of charitable societies, and took an active interest in church affairs and the spread of the gospel. He was a member and vestryman of Grace Church, the treasurer of the General Convention of the Protestant Episcopal Church and of Trinity School, and a director of the Commercial and Atlantic Mutual Insurance companies. Three daughters survive him.

EDWARD LEARNED.

Edward Learned, of Pittsfield, Mass., who obtained valuable concessions from the Mexican Government for the Tehuantepec Railroad Co., but whose franchise was afterward forfeited, died on the 19th inst., in his 66th year. He was born in Watervliet, N. Y., in 1820. He lived in Albany until after 1850, having been married 10 years before that date to Miss Stoddard, of Pittsfield. Originally a civil engineer, Mr. Learned was engaged at different times in his life in some of the most important enterprises of the country. He was principal owner of the Pittsfield Woolen Mills. His brother-in law, W. J. McAlpine, of this city, was engaged with him in many of his enterprises. They owned the Dix Island granite on the coast of Maine and made it for years the base of supplies for the construction of Government buildings. He was associated in contracts for the custom-houses in New Orleans and Charleston, the Treasury Building at Washington, and the granite basement of the Capitol at Albany. He was engaged in copper mining on Lake Superior for a time, and was one of the investors in the famous Silver Islet, whose pocket of silver was one of the richest ever found in this country, but was soon exhausted, and exhausted the pockets of the investors in it before they were satisfied that there was no more silver there. Mr. Learned was for a number of years president of the Ohio and Mississippi Railroad.

WASHINGTON NEWS.

(*From Our Regular Correspondent.*)

WASHINGTON, D. C., February 23, 1886.

NO ALLOWANCE FOR RUST.

The Secretary of the Treasury has rendered an important decision affecting imports of metals in the matter of an allowance for rust, which reverses the usual practice. The practice which appears to have been heretofore in vogue at certain ports, of allowing damage on manufactures of iron or steel when such damage resulted from extraordinary circumstances during the voyage of importation, does not seem to be supported by any authority of law. The question of the propriety of making any exception to the restrictions having been submitted to the solicitor of the Treasury, that officer advises, under date of the 29th ult., that it was evidently the intention of Congress to withdraw from the operation of Section 2927, Revised Statutes (wherein provision is made for the ascertainment by the appraiser of damage received by imported goods during the voyage of importation, and for the allowance of the damage so ascertained), all damage occasioned by rust or discoloration on iron or steel or on manufactures thereof, and consequently it mattered not whether such damage was occasioned by ordinary or extraordinary incidents of the voyage, and that, therefore, no allowance for damage occasioned by rust or discoloration could be made on the merchandise in question, no matter in what manner it was produced. No relief, therefore, can be afforded.

DUTY ON CERTAIN STEEL RODS.

In a trial which involved the question as to the classification, under the existing tariff acts, of certain pieces of rods of polished steel, cut into 3-foot lengths and larger than No. 3 wire gauge, the merchandise was classified by the collector at the time of importation as steel wire not specially provided for by size in the tariff acts, and subjected to a duty of 45 per cent. ad valorem, as "steel not specially enumerated or provided for in this act," while the plaintiffs claimed that it consisted of bars or rods of steel polished, which, as it cost over 10 cents per pound, was dutiable at the rate of 3½ cents per pound. The United States attorney reports that the proofs submitted showed that the goods were known and bought and sold in this country as "Stubb's steel rods"; that they were imported to be made into drill rods, and that after the charge of the court, which was entirely unexceptional, the jury returned a verdict for the plaintiff. The United States attorney seems to be of the opinion that the decision was correct. The Secretary of the Treasury advises an acquiescence therein by the department. The department acquiesces in the decision, revokes former decisions and directs that future practice conforms to that decision.

DUTIES ON ORES CONTAINING PRECIOUS AND BASE METALS.

The department, in reply to inquiry as to the dutiable character of ores containing precious and base metals, says that when silver in any ore predominates in value it is considered to be silver ore, and as such is exempt from duty under the special provisions in the free list for ores of gold and silver; where, however, lead predominates in value, the ore is considered as a lead ore, and is subjected to a duty at the rate of 1½ cents per pound, under the special provisions in the tariff act for "lead ore and lead dross." The question of classification, therefore, is one of fact, which can only be determined upon an examination of the importation for the purpose of ascertaining whether it consists of silver ore or lead ore, as aforesaid.

A DEPARTMENT DECISION ON STUBB'S STEEL WIRE.

Following the recent judicial action on the classification of certain steel wire known as "Stubb's steel wire" (under No. 5 gauge) the department decides as to the dutiable character of that article that reports thereon have been received from customs officers at New York and Boston, who concur in the opinion that the wire in question, though cut into lengths of from 18 inches to 4 feet, does not fall within the purview of department's decision of August 4, 1885, for the reason that the article therein described is of an entirely different character from the steel wire in question. The wire described in said decision was cut into lengths of 1 inch for a specific purpose, and thereby became a manufacture of steel wire. Stubb's steel wire has always been imported in lengths as above described, for the reason that to pack the same in coils would injure it for the purposes to which it is applied, namely, the manufacture of fine and delicate machinery for pinions, drills, &c. According to the reports received, the Stubb's steel wire, if smaller than No. 5 wire gauge, is classified for duty as iron and steel wire. If larger than No. 5 wire gauge, such merchandise is dutiable as "steel in bars."

INSTRUCTIONS AS TO WEIGHING.

The Secretary of the Treasury has instructed the collector of customs at New York that imported merchandise liable to duty by weights and measures should be invoiced at the weights and measures of the foreign country whence imported, under and in pursuance of Section 2837, Revised Statutes. If not so invoiced the entry should be rejected. Where, however, any entries are inadvertently allowed on invoices not specifying the proper weights, the appraiser should specify distinctly on the invoice the character of the invoice weights, and this specification by the appraiser may be accepted in lieu of the documentary evidence mentioned in department's decision of December 11, 1884 (not published).

CONSULAR INVOICE AND FEES.

At the instance of the Department of State, collectors of customs have been instructed to allow entries of imported merchandise valued at less than $50 without consular invoice, provided the importers act in good faith, and the importations are not purposely broken up with a view to evade the requirements of the statute concerning consular invoices. It is understood that hereafter the consular fee for authenticated invoices of imported merchandise valued at over $50 and less than $100 shall be 50 cents.

Subaqueous Photography.

Mr. E. G. Carey, assistant engineer of the Forth Bridge Works, Scotland, contributed to the *Photographic News*, a short time ago, an interesting article on subaqueous photography, from which we take the following:

The interest attached to recent attempts to obtain photographs in the caissons of the Forth Bridge is due rather to the novel constructions under which the experiments were conducted than to any degree of success which has hitherto been achieved. Before, however, proceeding with an account of the difficulties encountered and the results obtained, it will be well to describe in brief outline the construction and working of a caisson, so that the peculiar nature of the surroundings under which the work was performed may be the more readily understood. No better definition of the word "caisson" can perhaps be given than its literal translation from the French, signifying "a box" or "coffer." The caissons of the Forth Bridge are constructed of iron, are circular in plan, with a diameter of 70 feet, and in appearance are not at all unlike gasometers. The caisson, having been built on shore, is launched, floated out to the position of the pier and sunk, the upper edge being slightly above high-water level. Seven feet above its lower edge is placed an iron floor, which divides the caisson into an upper and a lower compartment. The lower compartment is charged with compressed air, forced in through piping by machinery on the surface, and forms, in fact, a huge diving-bell. The compressed air excludes the superincumbent water and enables workmen to descend into the lower compartment or air-chamber, through air-locks, similar in principle to the locks on a canal, and excavate the bottom on which the caisson rests. The "spoil" is drawn up in skips and the caisson gradually descends of its own weight, until a firm bottom is reached. The whole caisson, both upper and lower compartments, is then filled up with concrete, and on this base the pier is constructed.

Such, then, were the conditions under which it was desired to obtain a photograph in the air-chamber of a caisson, a huge diving bell, 70 feet in diameter, 7 feet high, sunk some 50 to 60 feet below high water, and charged with air, whose pressure was from 10 to 30 pounds per square inch higher than that of the atmosphere. The air-chamber was lighted by arc lamps suspended from the roof, the dynamos and motive-power being placed on the surface. During the first attempts three arc lamps were employed; subsequently two more were added to overcome as much as possible the pernicious haze—of which more hereafter—in the air-chamber. Each lamp was equivalent to 1200 candles, so that eventually a total power of 6000 candles was requisitioned. The roof and sides of the air-chamber were whitewashed to render them more conspicuous in the negative, and to diffuse the light thrown on them more effectively. Before proceeding into the air-chamber a trial was made on shore to obtain some data as to the probable length of exposure required. A group, lighted on either side by an arc lamp, similar to those employed in the caisson, was taken on an instantaneous plate of the same rapidity as those subsequently exposed in the air-chamber, the lamps being carefully shaded by screens. An exposure of 10 seconds with the largest stop gave fair results, and this period was assumed as the basis of operations in the caisson.

The first difficulty that presented itself inside the air-chamber was the formation of moisture on the lenses. After a few minutes, however, the glasses became warmed, and, being carefully wiped, no further trouble was experienced on this score. The author had provided himself with glycerine, intending to rub a film over the lens to check the formation of moisture on the glass;* but this was not required. The first exposures were 12, 20, 25 and 30 seconds, respectively, with the largest stop, instantaneous plates of average rapidity being used. Three arc lamps lighted the caisson, but one only shone directly on the objects focused. The whole of the plates were found, on development, to be considerably under-exposed. It was decided to considerably increase the length of exposure, and 10 days later a second attempt was made under similar conditions of lighting and plates. Exposures of 5, 10 and 15 minutes were given; but the results were very poor, indistinct and blurred, and particularly disappointing. Increased lighting power was obviously required; and for the next attempt five arc lamps were fitted in the air-chamber, being suspended from the ceiling. Augmentation in lighting power was followed by an immediate improvement in the negatives obtained; and two groups, exposure 7 and 8 minutes, instantaneous plates and largest stop, gave results of a more encouraging nature than any yet obtained. A lamp was placed on either side of the group, another immediately behind it, while the two remaining lamps illuminated the rest of the caisson.

In the final experiments made it was decided to try the effect of plates of exceptional rapidity, and in this last attempt XXXXX plates, similar to those in use for the most rapid yacht work, were employed. A further improvement resulted; a considerable gain in definition and sharpness was secured, due no doubt in part to the shortened exposure (1½ to 2 minutes being found sufficient), a great *desideratum* when figures are embodied in the subject. In this instance the whole of the arc lights were arranged in rows parallel to a straight line drawn from the camera to the center of group in front, and sufficiently far away from that line to avoid shining directly into the lens, while throwing as much light as possible on the objects. There can be, in conclusion, but little doubt that the haze in the air-chamber must always render the highest results unattainable. All that can be done is to seize the most favorable moment, when the haze is at its minimum, for the range of clearness of the atmosphere inside the air-chamber is very considerable. The air-compressing machinery should run slowly and steadily during the experiments, for any sudden inflow of fresh air will at once tend to raise the haze. Similarly, any sudden expansion of the air, such as that due to its escape, when the excavated material is drawn up through the lock provided for that purpose, at once produced a marked accession of fogginess.

If figures are introduced into the photograph they should wear as light-colored clothing as possible, for an inspection of the results obtained indicate at once with what greatly-increased clearness all white objects stand out, while it will be noticed with interest that the human eye, presumably from its glistening properties, has caught the light and gleams out of the picture with an unnatural glare hardly calculated to reassure the timorous visitor scanning the records of what he will encounter below, while endeavoring to brace his mind for a descent. Owing to the hazy atmosphere it will be found advantageous to keep the camera as close as convenient to the subject, thereby reducing the length of supervening fog as much as possible. So far as could be ascertained, no injury resulted to the plates either from the moisture below or from the heavy atmospheric pressure to which they were subjected. The lens used in the above experiments was by Dallmeyer, 2½ inches aperture and 18 inches focal length, the plates being 12 inches by 15 inches. Another caisson remains to be founded, when it is hoped further efforts may be made in this direction to secure photographs under conditions as novel as difficult, and with more success than has hitherto attended the attempts here briefly sketched.

* A method due to W. D. Valentine, of Dundee, and employed by him when engaged on submarine photographic experiments in connection with the ruins of the Old Tay Bridge.

Nails in California.

The San Francisco *Review* publishes the following figures covering the imports of nails to all points on the Pacific Coast for a series of years:

Imports.	Kegs.
1877	216,400
1878	187,360
1879	155,847
1880	158,482
1881	223,577
1882	195,402
1883	175,451
1884	69,066
1885	110,365

The quantity of nails used on the coast in 1885 was much larger than in any previous year, owing to the great demand for house-building and for country improvements. The factory at Berkeley, therefore, did well during the whole year. Outside of this there were very considerable imports by sea in the latter part of the year, reminding one somewhat of old times. This was caused by a disagreement between the hardware men and the factory, but all this has since been amicably settled. The price was nearly as low part of the year as it was in 1884.

The Pacific Iron and Nail Co., whose large works are located in Oakland, report a growing increase in their business. This company give steady employment to about 250 people for almost every working day during the year of 1885, and are at present one of the representative manufacturing industries of the Pacific Coast. The present capacity is over 900 kegs per day of cut nails and spikes. Machinery has been purchased and preparations are under way to increase their output to 1500 kegs per day. In addition to this they manufacture all kinds of steel, iron, brass and copper wire nails. Much has been said about wire superseding cut nails to a large extent, but this is not the case on this coast, and no increase in demand is perceptible up to the present time. Cut nails seem better adapted for the mands of this market. The nails manufactured by the Pacific Iron and Nail Co. are of an improved pattern, being much lighter (which means more to the pound) and more suitable for the uses of this coast. They are also made by an improved process of blending steel and iron together, thereby combining the strength and flexibility of these two metals. The hardware dealers give them the preference over any Eastern or other nails. Their market is not confined to the Pacific Coast, as they have also a large export demand from Mexico, Australia, China, Japan and the Islands, which, with their increased facilities, can be cultivated largely. The present consumption of coal is about 40 tons per day, and of iron and steel about 50 tons per day. They buy all the local scrap iron and steel possible, and are large importers from Europe, China, Japan and South America. The Pacific Iron and Nail Co. have a greater capacity for manufacturing than the markets of this coast require; hence they are large exporters of nails.

An interesting question in the law of negligence has just been settled by the Supreme Court in deciding the case of the Philadelphia Iron and Steel Co. *vs.* F. Marion Davis. This case came before the court on a writ of error to the judgment of Court of Common Pleas No. 1 of Philadelphia County, where Davis recovered a verdict of $10,000 for injuries sustained by the breaking of a clamp holding a 4-ton balance-wheel. This wheel was held in its place by two clamps; one of these clamps broke, and the engineer, instead of stopping the engine, allowed it to run on, the result being the fracture of the other clamp, its projection among the workmen and the injury of Davis. His skull was fractured, and he was rendered incapable of active work. At the trial of the case below the company's counsel took the ground that as the engine was run by the engineer after the clamps were broke, without an order from the superintendent, the accident was owing to the negligence of a colaborer, and the company were not responsible. The judge in the court below held that this view was erroneous, and that, as there was evidence that the machine was dangerous with two clamps, it could be more so even when crippled, and that the engineer was therefore justified in allowing the machine to run on, the responsibility being thrown upon the company. Justice Gordon, however, who files the opinion in the Supreme Court, holds that this view is an incorrect one. He says that if the two clamps were insufficient to hold the 4-ton balance-wheel any one might know that when one was broken the other was all the more likely to break, owing to the increased strain. He therefore reaches the conclusion that the accident was owing to the negligence of a colaborer, which conclusion relieves the company from responsibility and throws it on the careless engineer. The judgment is reversed and a new *venire* awarded.

Alabama, Coal, Coke and Iron.

The Birmingham *Age* makes the coal output of Alabama since 1873 as follows:

	Tons.		Tons.
1873	40,000	1880	340,000
1874	45,000	1881	375,000
1875	60,000	1882	800,000
1876	100,000	1883	1,400,000
1877	175,000	1884	2,000,000
1878	200,000	1885	2,225,000
1879	300,000		

In 1872 only 10,000 tons of coal were mined in the State. In 1879 a great impetus was given to coal mining by the opening up of the Pratt seam by the Pratt Coal and Coke Co. for steam coke and gas purposes, and the working of the Helena seam for grate purposes. Since that time many mines have been opened, and, as seen from the above table, the output has steadily increased.

Six years ago the Louisville and Nashville road hauled only 2000 tons of Alabama coal; now Pratt mines alone have a daily average output of more than 2000 tons. New mines are being opened up every year throughout the coal fields, wherever convenient access to transportation can be had. The opening up of the Warrior River and the deepening of Mobile Harbor would give a great impetus to coal mining, and Alabama, instead of ranking as the fifth or sixth coal-producing State, would in a few years rank next to Pennsylvania. In 1880 Alabama had 316 coke ovens; in 1884 the number had increased to 976, and it is safe to say that on the 1st of January, 1886, there were 1200 coke ovens in operation in the State. These 1200 coke ovens consumed the following number of tons of coal for each year named:

	Tons.		Tons.
1880	106,283	1883	359,699
1881	184,881	1884	413,184
1882	261,889	1885	515,550

The coke produced from these 500,000 tons of coal for each year named was as follows:

	Tons.		Tons.
1880	60,781	1883	217,531
1881	109,033	1884	244,609
1882	152,940	1885	304,509

This coke sells at from $2.50 to $3 a ton, and the output for 1885 was therefore worth nearly $900,000. It is a fact not generally known that Alabama, within the past few years, has grown to be the second coke-producing State in the Union. Pennsylvania comes first, Alabama second and West Virginia third. No other State, unless we except Pennsylvania, has better coking coal, and we may look for this industry to grow gradually into immense proportions. The production of pig iron since 1876 is as follows:

	Tons.		Tons.
1876	24,732	1881	98,081
1877	41,241	1882	112,765
1878	41,492	1883	172,465
1879	49,811	1884	189,990
1880	77,190	1885	189,660

We have placed the output of pig iron in 1885 at the same as 1884, because no additional furnaces were built during that year. Here we have some idea of the growth of these three leading industries in Alabama, the products of which were worth for 1885 about $7,000,000, or about one-fourth the value of the entire cotton crop of the State. Four more furnaces will be built in and around Birmingham during the present year, and others will no doubt be built in other parts of the State; hundreds more coke ovens will be built; mines will be opened and the coal output be increased; indeed in the history of the State the future of these industries was never brighter.

French Efforts in China.—The joining of the English and German forces to secure the Chinese railway business, and the resulting powerful syndicate, have served to put the French on their mettle and to urge them to vigorous action. They have resolved to do their utmost to counterplot their opponents and to obtain the largest share of the great prize. And their utmost amounts in this instance to a great deal. They have certain treaty rights which give them a claim to the preference in this particular matter. But, though they will turn this claim to the best account, they will not rest their chance wholly upon it. They, too, have formed a syndicate as a set-off to the Anglo-German, and it is a very fair set-off to that powerful combination. The Comptoir d'Escompte, which has taken the matter in hand, is a power in China as well as in France, and M. Denfert-Rochereau, its director, has brought it into all the chief iron-making and engineering firms and companies of his own country. Denain, les Chantiers de la Loire, Fives-Lille, Fourchambault, and the Anciéries de Saint-Etienne, constitute a very fair counterpart to Krupp & Co. The representative of this syndicate, M. Thévenet, who is already on qis way to Tientsin, is an engineer whose experience among the Chinese, and diplomatic ability, mark him out as peculiarly fitted for the post. Something should come of this powerful organization of "mission" and "syndicate," backed up, as it will be, by all the influence which the Government can bring to bear.

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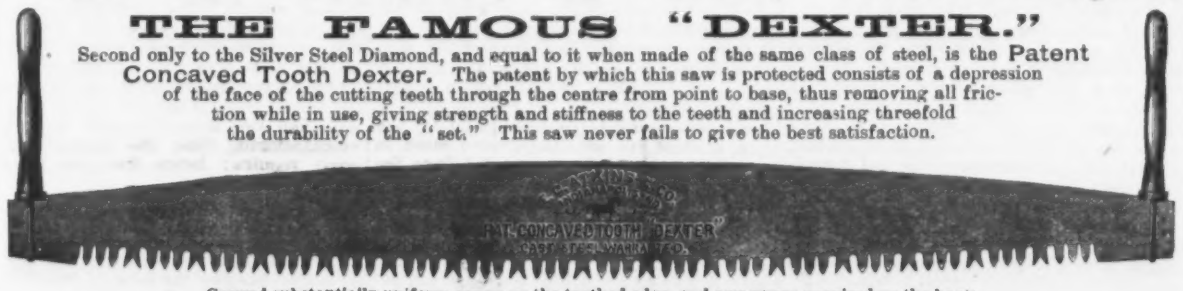

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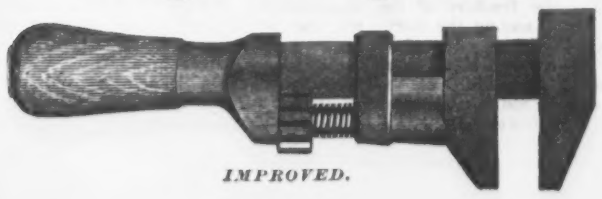

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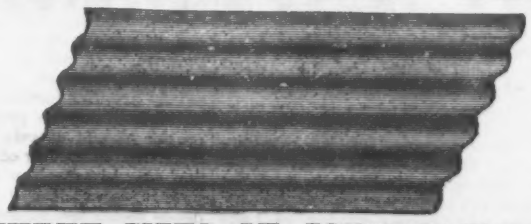

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1 each 40 and 60 lb. Trip Hammers.
1 "Little Joker" Plating Machine.
1 No 3 Stiles Press.
10 Foot Presses, assorted.
8 Power " "
12 Punching and Shearing Machines, assorted.
2 Return Tubular Boilers, 45 H.-P.
1 Vertical " 50 H.-P.
1 " Boiler each 8 and 25 H.-P.
2 Hoisting Engines, 8 and 10 H.-P.
3 No. 2 Hand Milling. Pratt & Whitney.
1 Cutter Grinder. Grant & Bogert.
1 Horizontal Engine, 45-H.-P.
1 Vertical Engine, 10 H.-P.
1 Die Sinking Machine.
1 48-in Boring and Turning Mill. Pond.
1 40-lb. Bradley Hammer.
1 12-in. Shaper, 2 Tables. Betts.
1 No. 5 Root Blower.
1 Vertical Car Wheel Borer. Sellers.
1 Suspension Drill.
Also full line of New Machinery.
New York Agency TAYLOR MFG. CO., Engines, Boilers, &c. Correspondence solicited.
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CHARCOAL FURNACE

FOR SALE.

TWO STACKS. Situated at Nicollet, Wisconsin.

For particulars apply to

ROGERS & CO.,
90 Dearborn St.,
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FOR SALE.

An old-established Stove and House Furnishing Business located on one of the leading avenues in this city. Now doing a good paying trade. This is a chance seldom offered. Reasons for selling, the advertiser is engaged in another business.
Address "PROMPT," Box 41,
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

FOR SALE.

Three-fourths interest in an old-established Hardware Business in a large Western City; doing a good business and A No. 1 location; sales from $40,000 to $45,000 per year, and could be increased considerably; stock all saleable and will invoice about $15,000; for further information, address "HARDWARE," Office of *The Iron Age*, 13 W. Third St., Cincinnati, O.

FOR SALE, CHEAP.

One 32 x 54 Horizontal Corliss Engine.
One Pair Harris Corliss Double Engines, 28 x 60.
One 16 x 48 Corliss Engine.
One 14 x 42 "
Six Horizontal Tubular Boilers, 50-H.-P.
One Horizontal Tubular Boiler, 80-H.-P.
One No. 11 Sturtevant Blower.
One No. 4 "
Two 50-inch Hawkins Exhausters.
D. B. CRUICKSHANK,
243 Dyer St., Providence, R. I.

For Sale.

1200 feet 8-inch Cast-Iron Pipe, 56 lb. to the foot, in good condition and the best make of pipe. Also a large lot of Machine Bolts.
Address BOYLE & BISSELL,
Bissell Block, Pittsburgh, Pa.

FOR SALE

Owing to the death of Peter Bandey, Muncie, Indiana, is virtually left without an Architect or Planing Mill, and the Bandey Planing Mill is for sale at a bargain, on reasonable terms, together with machinery and residence. For full particulars, address
HEATH & LENNON,
Muncie, Indiana.

FOR SALE, MACHINERY.

Planer, 24 in. x 24 in., to plane 6 ft. New. $375.
" 37 in. x 36 in. " 8 ft. " $600.
1 lathe, 18 in. x 6 ft. $146. 16 in. x 6 ft. ditto. $120. 2d-hd.
Fox Lathe, with Turret for brasswork. New. $400.
1 uley Lathe, 26 in. x 19 ft., with Boring Attm't. $950.
New Speed Lathes. Heavy, $45, $50, $60, $75.
Pack Geared Drill Press. New. 28-in. swing. Modern style. $175.
Rapid Nut Tapper. Heavy. 4 spindles. $100.
Improved Nut Machine, for 1-in Nuts and under. $500.
Ten large Improved Portable Forges at $10.
YORK & BENTON, Cleveland, Ohio.

SCRAP IRON.

We buy and sell all descriptions of Iron and Steel Scrap. Correspondence solicited.

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Wanted.

To buy Stocks of goods, parts of Stocks, Job Lots, &c., *cheap for cash*, of Hardware, Tinware, Woodenware, &c., &c.,
Address "CASH BUYER,"
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

Wanted.

A competent Draughtsman accustomed to Steel Works construction and Steam Engineering.
Address "DRAUGHTSMAN," Lock Box 1086, Philadelphia, stating salary expected, experience and references.

WANTED.—A situation as Superintendent, Manager or Foreman of an Iron or Brass manufactory. Am an experienced practical mechanic in the manufacture of Engines, Presses, Dies and General Machinery; also Chandelier, Kerosene Lamp and Brass Work; have had successful experience in the management of shops and hands. Can furnish good reference in all particulars. Address "L,"
P. O. Box 4810, Boston, Mass.

Special Notices.

MACHINERY SECOND-HAND, A1 ORDER.

Brown & Sharpe Universal Miller.
Pratt & Whitney No. 2 Miller. Lincoln Pattern.
Garvin No. 3 Milling Machine.
Brainard No. 5 Miller.
Pond Index Miller.
Pratt & Whitney Marking Machine.
" " Screw Machine No. 3. B'k Gear.
" " Engine Lathe, 15 in. x 6 ft.
" " " " 15 in. x 5 ft. Taper.
Putnam Engine Lathes, 17 in. x 6½ ft. No screw. Rod feed only.
Pond Engine Lathe, 16 in. x 7 ft. Complete
Harrington " " 16 in. x 6 ft. "
Bridgeport " " 16 in. x 8 ft. "
New Haven " " 18 in. x 8¼ ft. "
Ames " " 20 in. x 10 ft. "
Perkins " " 26 in. x 16 ft. "
20 in. x 6 ft. " Pratt & Whitney.
20 in. x 6 ft. " Whitworth.
20 in. x 4 ft. " New Haven.
26 in. x 6 ft. " Hendey.
36 in. x 12 ft. " Niles.
No 2 Stiles Press.
No. 3½ " "
No. 4 " "
No. 4 Long & Alstatter Punch.
No. 6 Wilder Punch.
40 lb. Bradley Hammer.
100-lb. " "
400 lb. Steam "
50-in. Vertical Boring and Turning Mill. Phila
60-in. " " " " " " Leffell.
108-in. " " " " " " Niles.

Bolt Cutters, Milling Machines, Drills, Shapers, Lathes, Planers, &c., *new*, and also a line of second-hand machines not mentioned above.

State what you want to buy, and we will be glad to correspond with you.

Call and see us.

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Wholesale Auctioneers,

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Regular sales of Hardware, Cutlery, &c. Sales cashed promptly. Consignments of goods solicited.

Cotton Gin Ribs.

HARDWARE MERCHANTS

and others furnished with materials of all kinds for making and repairing COTTON GINS, RIBS and SAWS for repairing ALL makes of gins. Send for Price List. Address THE BROWN COTTON GIN CO., Manufacturers of Cotton Gins Feeders and Condensers, New London, Conn.

Vulcan Works, Baltimore, Md.

This old-established Foundry and Machine Shop for sale or lease. Has a complete equipment in all departments. Tools for sale. Send for catalogue. Address as above.

FOR SALE.

15 Lever Lard Presses.
Lot of Lard Press Parts and Plates.
3 Cast Iron Superheaters.
125 Tons Cast Machinery Scrap.
25 Tons 35-lb. Iron Tee Rails, fit to relay.
ROBERT MOFFLY & CO.,
Iron and Metal Dealers.
N. E. cor. 9th and Jefferson Sts., Philadelphia.

FOR SALE.

ROLLING MILL MACHINERY for working old rails. Nearly, if not quite, complete plant. Size of trains, 9 in. and 16 in.

DAN'L W. RICHARDS & CO.,
92 Mangin St., New York.

For Sale.

One of the best located Hardware stands in Northern Ohio; splendid country trade; best of shipping facilities; will invoice $15,000 to $16,000; stand 20 years old; gross sales 1885, $42,000; in a town of 4000 inhabitants; must sell; reason, ill-health and age of the proprietors.
Address "TRADE MARK,"
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

For Sale.

Heavy Upsetter or Bolt Header, suitable for Bridge Rods and Large Bolts; upset 2¼ in. Head to 3 in.; Frisbie Friction Clutch on it; also 4 in. Bolt Cutter, "National." The largest and most complete line of Bolt, Nut and special machinery in the line in the world. Address
THE NATIONAL MACHINERY CO.,
Tiffin, Ohio.

For Sale.

Second-hand

DROPS and LIFTERS.

BEECHER & PECK,
Lock Box 122, New Haven, Conn.

SCRAP IRON.

We buy all kinds of Iron and Steel Scrap, Burnt Iron, Old Rails, &c., &c. Write us, naming quantity, price, &c.

ROBINSON & ORR,
115 Water St., Pittsburgh, Pa.
(ESTABLISHED 1859.)

CHAMBERS ST. OFFICES AND SMALL STORES TO LET

in Nos. 5, 7 and 9 Chambers St., nearly facing Chatham St., and convenient to all the principal routes of city travel. Also 24 Duane St. and 1 Platt St. Apply to
GEORGE W. BRUCE,
1 Platt St., New York.

A Leading Manufacturing Concern

is desirous to open a branch house in Chicago, in connection with one or two other reliable Eastern firms who may want to be similarly represented, having one representative, and dividing expense of the undertaking pro rata.
Address "ENQUIRER,"
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

SITUATION WANTED.—As Foreman or Assistant Superintendent in a Machine Company. Have had practical and theoretical education. Understand my business thoroughly. Expectations not too high. Address "D. K.," Box 181,
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

Special Notices.

Second-hand Machinery For Sale

One Engine Lathe, 16 ft. bed, 48 in. swing. Bement's make.
One 20-ft. bed 96 in. Chucking and Boring Lathe.
Two Engine Lathes, 87 in. swing, 20 ft. 6 in. bed, Geared in Face Plate, Screw Feed, Compound Rest.
One Iron Planer, planes 24 ft. long, 62 in. x 62 in. Excellent condition.
One Iron Planer, planes 12 ft. long, 78 in. x 72 in. Bement's make.
One Iron Planer, planes 10 ft. long, 60 in. x 60 in. Bement's make.
One Iron Planer, planes 8 ft. long, 30 in x 30 in.
Two Iron Planers, plane 6 ft. long, 24 in. wide.
Three Iron Planers plane 4 ft. long 24 in x 24 in.
Three " " 5 ft. long 20 in. x 20 in.
One 1750-lb. Bement Steam Hammer. Excellent.
One Small Steam Hammer.
One 5-foot Radial Drill.
One 40-inch B. G. S. F. Upright Drill. N. Y. Steam Engine Co.'s make.
Two Slotting Machines, 6-in. stroke. Bement's make.
One 10-inch Shaping Machine.
One Axle Lathe, for car axles.
Two Durrell's 7 Spindle Nut Tappers.
Send for lists New and Second-hand Tools. too ong for publication.
Sole Agents EDISON SHAFTING MFG CO.

The GEO. PLACE MACHINERY CO.,
121 Chambers and 103 Reade Streets,
NEW YORK.

SECOND-HAND MACHINERY
IN GOOD ORDER.

One 20 x 48 Corliss Engine.
One 18 x 36 Hor Engine, built by Jacob Navler.
One 14 x 15 Vertical Engine, New York Safety Steam Power Co
One 14 x 20 Hor. Engine, Campbell & Rickards.
One 12 x 42 Corliss Engine.
One 12 x 15, Supplee Engine Co.
One 8 x 16 Porter Engine.
One 8 H.-P. Shapley Engine and Boiler.
One 6 " Baxter Engine.
One 50 " Vertical Tubular Boiler.
One 50 " Locomotive Boiler.
One 60 " Hor. Tubular Boiler.
One 40 " Hor. Tubular Boiler.
One 16 x 6 Harrington Lathe.
One 17 x 6 New Haven Lathe.
One 16 x 6 Hartford Engine Lathe.
One 26 x 12 Engine Lathe. New Haven.
One 38-inch swing Column Drill. New Haven.
One 50 inch Vertical Boring Mill.
Also complete outfit for a Sash and Door Factory including Planers, Moulding Machines, Band Saws, Tenoning Machines, Upright Moulding Machines, Scroll Saws, Mortiser Saw Benches, &c, all modern Tools, but little used.

HENRY I. SNELL
135 North 3d Street, Philadelphia, Pa.

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The largest and most reliable stock of Engines and Boilers in America. All sizes and styles, and all made of the very best material at lower prices than common, cheap country-made work can be sold. These Engines are all made interchangeable by special machinery. Agents wanted, and orders from the Trade solicited.

Write for Illustrated Catalogue and particulars.

H. M. SCIPLE,
107 and 109 N. Third St., Philadelphia, Pa.

FOR SALE.

Foundry and Machine Shop, with Patterns, Lumber, Planer and all Machinery in running order; located at Jefferson City, Mo., 10 feet from Mo. P. Railroad, and 60 ft. from Mo. River; Building large two-story brick, 125 by 198 feet. Price $7500; cash required, $1500; balance $1000 annually; big bargain; worth $25,000 to proper party; must be sold on account of death of owner. No Foundry within 65 miles.
Address MRS. SOPHIA FISHER,
Jefferson City, Mo.

FOR SALE.

Large lot second-hand Iron Tanks, from 5000 gals. down; all sizes and shapes.
About 625 ft. 4-in. Wrought-Iron Tubes with threads cut in them; good as new.
Lot new 100 gal. Oil Tanks with pumps; all complete.
Lot second-hand Engines and Boilers.
Lot new Mule and Horse Shoes, Wrought and Cast Scrap, Red and Yellow Brass.
BUSSENIUS, CUNLIFFE & CO.,
Dealers in Scrap Iron and Old Metals.
12th and Washington ave., Philadelphia.

HOISTING ENGINES.

New 10 H.-P. worm-geared Hoisting Engines; Steam Cylinder 6 in. bore, 8 in. stroke; geared 16 to 1; Drum 20 in. diameter, 18 in. long Improved Cone Friction for Hoisting and Lowering. Also 6 in. x 6 in. Williamson Spur-Geared Hoister, with Clutch and Link Motion. Drum 8 in. x 16 in.
A. G. BROOKS,
261 N. Third Street, Phila.

FOR SALE.

2800 acres Brown Hematite Ore Lands, with Fire Brick Clay and Manganese; situated on East Tenn. Railroad, in Cherokee, Alabama. There is a Depot, Furnace and 50 Buildings. This property will be sold at a sacrifice. *All information given by* BRANCH'S SON & CO.,
Augusta, Ga.

For Sale.

Narrow Gauge Rolling Stock of the Philadelphia and Atlantic City Railroad, consisting of 11 Locomotives and 24 Passenger Cars; also Gondola Dump and Coal Cars; Gauge of road, three feet six inches. Apply to W. S. WILSON, purchasing agent, 227 South 4th St., Philadelphia.

Specialties in Cutlery.

Having unexcelled facilities for manufacturing novelties in Cutlery, Shears, Edge Tools, &c., we solicit correspondence with inventors or any who desire to have these articles manufactured and pushed. EMPIRE KNIFE CO.,
West Winsted, Conn.

NOTICE.

Large Buyers of Shafting are requested to send specification for special prices.
MERWIN McKAIG,
Cumberland, Md.

Special Notices.

MACHINERY.

1 Corliss Beam Condensing Engine, 30 in. x 72 in.
1 Porter-Allen Engine, 16 in x 30 in.
1 New Horizontal Corliss Engine, 14 in. x 30 in.
1 New Horizontal Corliss Engine, 12 in. x 30 in.
1 New Horizontal Corliss Engine, 10 in. x 22 in.
1 Horizontal Automatic Cut-off Engine, 12 in. x 18 in.
1 15-Horse Portable Engine and Boiler.
1 10-Horse Copeland & Bacon Hoisting Engine and Boiler.
1 10-H.-P. Hoisting Engine and Boiler.
6 Horizontal Tubular Boilers, 5 ft. x 22 ft.
1 New Horizontal Tubular Boiler, 4¼ ft. x 14 ft.
1 Horizontal Tubular, 3½ ft. x 14 ft.
1 150-Horse Locomotive Boiler. Steamboat style.
1 Locomotive Boiler, 3 ft. x 12 ft.
1 Upright Boiler, 4 ft. x 11½ ft.
2 Lathes, 22 in. x 12 ft.
3 Lathes, 16 in. x 6 ft.
1 Lathe, 15 in. x 6 ft.
1 Lathe, 15 in. x 4 ft. 6 in.
1 12 in Slotting Machine.
1 20-in. Upright Drill.
1 36-in. Band Saw.
1 Wood & Light Milling Machine, No. 4.
1 Daniels Wood Planing Machine, 3 ft x 30 ft.
1 No. 2½ Bliss & Williams Foot Press and Dies.
1 No. 7 Knowles Steam Pump.
1 No 4 Davidson Steam Pump.
3 2-in Judson Governors.
1 Spur Wheel, 20 feet diameter, weight 22 tons.
Shafting, Pulleys, Hangers and Miscellaneous Machinery.

J. GRAY,
No. 37 Dey st., New York.

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LARGE SIZE, 500 Pages, 6 x 9½ in.
Full Leather, each, $8.00.
POCKET SIZE, 250 Pages, 4 x 7 in.,
Full Leather, each, $4.00.

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Alphabetical Arrangement.
INDEXED THROUGH.

Bills can be priced and quotations noted in one-quarter of time required by old classification.

Send for Circulars.

B. Lamberson,
PORTLAND, OREGON.

FOR SALE—RARE BUSINESS OPPORTUNITY.

Machine Shop and Foundry in the Mississippi Valley, on three great trunk lines of railway. Cheap fuel. Now running 10 hours full on ordered work. Owners of valuable Patent Specialties. Will be sold cheap. Don't write unless you mean business Address "X," Box 88,
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

FOR SALE.

ROOT BLOWERS, Nos. 1, 2, 3, 4, 5 and 7.
SIURTEVANT BLOWERS, Nos 1, 3, 6, 7, 8 and 10.
BAKER BLOWER, No. 4.
Engines, Boilers, Pumps, Tanks, Jewelers' Rolls, Hand Air Compressor and a variety of Machinery. Correspondence solicited.
C. R. BIGELOW, M. E.,
45 Dey St., New York City.

For Sale.

One of the best located Hardware stands in Southwest Virginia. Rapidly growing town of 5000, with good country trade. Only one other Hardware store in the place. Stock between $5000 and $6000. Splendid opportunity.
Address "GOOD LOCATION,"
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

FOR SALE OR LEASE—The Saw Factory located at Arlington, Mass., near Boston recently owned and operated by Welch & Griffiths. Apply to ROB'T. G. BUSHNELL, 81 John St., New York, or H. W. DE COURTENAY, 94 Pearl St., Boston.

Wanted.

A Superintendant for an Open-Hearth Steel Works; one who has had experience in Rolling Boiler Plate. Give references, where and in what capacity employed, what salary expected.
Address LOCK BOX No. 693,
Pittsburgh, Pa.

Nut and Bolt Machinery.

The undersigned will receive proposals for the purchase of a Bolt and Nut Works, consisting of Nut Machines, Bolt Headers, Burdick Shear, Tappers, Bolt Cutters, Washer Machines, Furnaces, Burring Machines, Lathes, Planers, Blacksmiths' Tools Pulleys, Hangers and all the paraphernalia for making Nuts, Bolts and Washers. All machines in perfect order and of most approved patterns. Will be sold on liberal terms.
Address FOWLER & SONS,
Buffalo, N. Y.

Wanted.

A Traveler of ten years' experience desires a line (on commission) of Wood and Willow Ware, House-Furnishing, Agricultural Implements and any specialties in Metal or Wood. Territory, S. C., Ga., Fla. and Ala. Good references.
Address "BOX 168,"
Griffin, Ga.

Wanted to Buy.

Old Iron and Steel Wire Rope, Burnt Iron &c.
Address, stating price, quantity, &c.
SITES, GILL & CO.,
222 and 224 So. Third Street,
Philadelphia, Pa.

WANTED.—A Situation as Foreman in an Iron Foundry; one who has had 20 years' experience as such. Is a practical Moulder, and thoroughly competent to take full charge on large or small work. Has been very successful in handling of workmen. Would like to correspond with parties in need of a Foreman. Address "METAUX"
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

HAVING left my position as Foreman of a large Iron Foundry doing Heavy and Light Machinery Casting in Loam, Dry Sand and Green, I would be pleased to hear from parties in search of a Foreman. Will refer to my late employers.
Address "LOAM,"
Office of *The Iron Age*, 66 and 68 Duane St., New York.

BUSINESS MANAGER.—The advertiser, aged 36, now occupying position of trust with a large manufacturing concern, desires a change of location on account of health of his family. He is a first-class Bookkeeper and a general business man. Good references and security bonds if desired. Address A. D. C.
Office of *The Iron Age*, 66 and 68 Duane St., N. Y.

Trade Report.

British Iron and Metal Markets.

[*Special Cable Dispatch to The Iron Age.*]

LONDON, WEDNESDAY, February 24, 1886.

Scotch Pig.—The market is unchanged. We quote makers' brands as follows:

Coltness, alongside, Glasgow			47/
Langloan,	"	"	44/6
Gartsherrie,	"	"	43/
Summerlee,	"	"	47/6
Carnbroe,	"	"	44/
Glengarnock,	"	Ardrossan	43/6
Eglinton,	"	"	40/
Dalmellington,	"	"	42/6
Shotts,	"	at Leith	45/6

Carriage from Ardrossan to Glasgow is 1/ ₱ ton.

Cleveland Pig.—The market is a little weaker. We continue quotations, f.o.b. shipping ports:

Middlesboro'	No. 1 Foundry	37/
"	No. 2 "	36/
"	No. 3 "	31 @ 31/6
"	No. 4 Forge	30/6

Bessemer Pig.—The market is not so steady. W. C. Hematites are quoted 43/ for mixed lots, Nos. 1, 2 and 3, equal portions, f.o. b. shipping ports.

Bessemer Blooms.—Market a little steadier. We quote 7 x 7 inches, £6. 5/ @ £6. 10/.

Manufactured Iron.—The market is irregular. We quote at works:

		£	s.	d.	£	s.	d.
Staff. Ord.	Marked Bars	7	10	0 @			
"	Medium "	6	0	0 @	6	10	0
"	Common "	5	10	0 @	5	15	0
Hoops, 20 W. G. and over.							
"	Common Best	6	15	0 @			
"	Medium	6	5	0 @	6	10	0
"	Common	6	0	0 @	6	7	6
Sheets, 20 W. G. and under.							
"	Ordinary Best	7	15	0 @	8	5	0
"	Common	7	5	0 @	7	15	0

Steel Rails—Are unchanged. We quote £4. 15/ @ £4. 17/6, f.o.b. shipping ports.

Old Rails.—Market is irregular. We quote Old D. H.'s, c.i.f. New York, 60/.

Scrap.—The market is irregular. We quote Heavy Wrought, 50/; Bessemer Crop Ends, run of mill, 54/ @ 56/, c.i.f. New York.

Copper.—The market is a little steadier. We quote Best Selected, £44 @ £45, and Chili Bars, £41 @ £41. 10/.

Tin.—The market is a little steadier. Straits Tin, spot, is quoted £93 @ £93. 10/, and futures, £93. 10/ @ £94.

Tin Plates.—The market is a little firmer. We quote:

Tin Plates, 10x14, 1st qual.	Charcoal		19/6 @ 21/6
" "	2d "	"	18/6 @ 19/
" "	1st "	Coke	17/6 @ 18/
" "	2d "	"	18/ @ 18/6

Spelter.—The market is unchanged. We quote Ordinary at shipping ports, £15 @ £15. 2/6.

Lead—Market unchanged. We quote Common English Pig, £12. 12/6 @ £12. 15/.

Freights.—Steam from Glasgow to New York, 7/6 @ 9 6.

Financial.

Office of *The Iron Age*,
WEDNESDAY EVENING, February 24, 1886.

Speculative circles have been disturbed during the week by a rupture of the transcontinental pool, promptly followed by cut rates in freight from the Pacific Coast, engagements having been made at $8 ₱ ton by the Pacific Mail from San Francisco to New York, while the reductions per rail are said to range from 25 % to 40 %. Of still more significance is the advent of President Gowen, of the Reading Railroad, as an antagonist of the Drexel-Morgan syndicate, and one too formidable to be treated lightly. Having obtained control of the large block of Reading stock which belonged to the Vanderbilt estate, he is in a position, according to common report, to thwart the plans of his adversaries as respects the reconstruction of that property. Rumor also said that President Garrett, of the Baltimore and Ohio Railroad, was by no means inimical to the schemes of Gowen, as an entrance to New York City via the New Jersey Central was a possible outcome of this latest *coup* of the great financier. The actual facts none profess fully to comprehend.

The Stock Exchange markets have been agitated by conflicting rumors, causing irregularity, and prices are generally lower, as a result of realizing sales. On Thursday the rupture of the Transcontinental Association was followed by a general decline. Pacific Mail was conspicuously weak. On Friday the coal stocks were raided on the news of a hitch in the Reading scheme, and cut rates by the Transcontinental lines helped further to unsettle the market. On Saturday there was much activity but no improvement, the bears renewing their efforts for a decline. Gold shipments also operated unfavorably. The coal shares broke on the announcement of Mr. Gowen's purchase of Reading shares. Monday was a holiday. Tuesday was without special feature. To-day rumors were abundant, but there was a scarcity of facts. The bulk of business was done in the coal shares on an irregular market, closing as follows: St Paul and Duluth, 42⅛; preferred, 109; Long Island, 89⅜; Lackawanna, 128⅜; Delaware and Hudson, 102¾; Erie, 28; preferred, 61⅛; Reading, 26⅛; Jersey Central, 53⅞; Lake Shore, 87⅞; New York Central, 106½; New York and New England, 37½; Pacific Mail, 50⅛; St. Paul, 93⅝; Union Pacific, 49; Western Union, 72¼.

United States bonds closed as follows:

	Bid.	Asked.
U. S. 3 per cents	100⅛	—
U. S. 4½s, 1891, coupon	113½	113¾
U. S. 4s, 1907, coupon	126	126¼
U. S. Currency 6s, 1895	128½	—
U. S. Currency 6s, 1896	129	—
U. S. Currency 6s, 1897	131½	—
U. S. Currency 6s, 1898	133½	—
U. S. Currency 6s, 1899	135¼	—

Reports of general business as gathered from interviews with prominent merchants and manufacturers in New York are of a cheerful character. It is conceded, however, that low prices may be expected through the coming season. Manufactures everywhere are reviving, and activity in the iron trade is especially notable. This means a demand for coal surpassing that of last year, when 32,000,000 tons were produced. The coke strike in Pennsylvania has at last terminated, bringing welcome relief. A wholesome sign is the augmenting volume of east-bound shipments from Chicago, amounting to 48,146 tons, an increase of 11,643 tons over the previous week, and largely in excess of the corresponding week last year. A decision of the trunk lines to advance the rates on live stock and dressed meat March 1 is explained by Commissioner Fink to have no reference to rival interests as between stock-growers and dressed-beef shippers, the design being rather to avoid the discrimination into which the railroads were unwittingly led. Among dry-goods jobbers the distribution has been of good proportions, with a seasonable trade in progress at interior markets. A hardening of values is noticed as a natural effect of demands for increased wages, an advance of 10 % from March 1 being quite general. In breadstuffs the market has experienced a new sensation arising from an export demand, which is now regarded as more hopeful than for a year past, and a new movement was observed in the provision trade—all of which is attributed to confidence inspired by a steady market. Wheat is about 3¢ ₱ bushel higher. Cotton droops under the heavy stock in sight and declining Liverpool quotations.

The Secretary of the Treasury issued the 124th call for the redemption of bonds of the 3 % loan of 1882. Notice is given that the principal and accrued interest of the bonds will be paid at the Treasury of the United States, in the city of Washington, D. C., on the 1st day of April, 1886, and that the interest on said bonds will cease on that day.

The weekly statement of the Associated Banks showed a decrease of $2,767,125 in surplus reserve, which now figures at $3,700,875, against $34,468,000 this time last year. In loans there was an increase of $3,535,400, but deposits declined, owing chiefly to gold exports, for which the engagements this week are about $3,000,000.

The Bank of England on Thursday reduced its rate of discount from 3 % to 2 %. The banks of France and Germany are gaining rapidly in specie. The rates of sterling exchange in New York are not materially changed.

The exports from this port, exclusive of specie, during the week were $828,535 above those of the previous week, the total valuation being $5,502,661, making the aggregate since January 1 $45,502,316, as compared with $53,765,773 for the same time in 1885, and $48,506,367 in 1884. Included were 397,768 bushels of wheat, 12,613 bales of cotton and 8,250,000 gallons of petroleum.

According to the Custom-House reports the imports of specie and bullion at this port during the week were $310,003, making a total of $1,691,544 since January 1. The exports of specie during the same time amounted to $3,113,773, including $2,000,000 in silver, making a total of $8,318,380 since January 1, against $5,010,000 for the same time in 1885. The imports of merchandise at this port during the week were $1,065,000 below those of the previous week, the total valuation being $7,858,697, of which $2,085,000 represents dry goods. The aggregate since January 1 is $56,212,843, against $55,406,273 in 1885, and $67,990,789 in 1884.

Metal Market.

Copper.—The market has been without any special features, though there is a stronger feeling, largely growing out of an advance on the other side. It may be stated that there are indications that the relative positions of this and the foreign markets may undergo some change. Hitherto we have been considerably above it. The causes at work to bring about some modifications may be summed up as follows: Formerly our Copper refiners obtained a large part, if not the bulk, of their supplies of furnace material from Arizona. Now fully one-half of the product of that Territory is controlled by one concern, which does its own refining. The other refineries must therefore turn to other sources of supply for furnace material, and Montana is their only field. One of the large producers in that district does its own refining now at Bridgeport, and another competitor is looming up in the shape of a works to be built near St. Louis to work under the system developed at the great works of the Vivians, at Swansea. The outgrowth of this movement, which was begun in 1885, is that larger quanties of Montana Copper will be refined in this country and will seek a market here, relieving the foreign market to that extent and weighing upon our own. Such causes do not, of course, operate in a month, nor do they prevent our following foreign quotations quickly at times, but still they should not be lost sight of. Arizona Copper has obtained a firm footing and a recognized standing after a sharp struggle which those in the trade have not quite forgotten. Montana may make a similar contest. The annual report of the Quincy Mining Co., just issued, shows the cost of production to have been, on a yield of 5,848,497 ℔ in 1885, 7.5¢, including all expenses, against 8.63¢ in 1884, a record highly creditable to its management. We quote Lake Superior 11.40¢ @ 11.50¢, and Baltimore 10½¢ asked. The following are the list prices for Manufactured Copper: 16¢ @ 17¢ for new Sheet Copper, 16¢ for Braziers, 16¢ @ 17¢ for Bolts and 19¢ @ 20¢ for Bottoms; American Yellow Metal Sheathing and Nails, 11½¢; Rods, 15¢, and English in bond, 13¢. We learn from London by cable to-day that the market is a little steadier.

Tin.—A fair amount of business has been done at $20.60 @ $20.65, for March and April, and further quantities might be placed at $20.65, while sellers usually ask $20.70. The Tin market, according to our cable dispatch to day, is a little steadier. *Tin Plates.*—There has been a little more activity, and the tone is better, with values unchanged. We quote for ordinary brands in large lines per box: Charcoal Bright, $4.87½ @ $5.50; do. Ternes, $4.35 @ $4.50, and Coke Tin, $4.37½ @ $4.60. From London we learn to-day that Tin Plates are a little firmer.

Lead.—During the week several hundred tons of Lead have been sold at prices ranging from 4.90¢ to 5¢, and the market closes quiet, but strong, at 4.95¢ @ 5¢. Offerings are light, but, on the other hand, consumers are fairly well supplied for the early future, and show a disposition to await developments. The limits on Foreign Lead have been withdrawn, and Common cannot now be imported at less than 4.95¢. The last sale advised by mail from St. Louis is a lot of 400 tons at a figure equivalent to 4.91¢ here. There is no change to report in the London market.

Spelter.—The market in the West is firmer, and our local market, dependant as it is upon it, has followed suit. We quote Ordinary Western, 4.50¢ @ 4.62½¢, while Silesian is nominally 5¢. Spelter remains unchanged in the London market.

Antimony.—This metal is dull at 8¾¢ @ 9¢ for Hallett, and 9¼¢ @ 9½¢ for Cookson.

Coal Market.

The Anthracite Coal trade shows no improvement. On the contrary, prices are hardly as strong as one week ago. They are nominally about as follows: Grate and Egg, $3; Stove, $3.45; Chestnut, $3.40; Pea, $1.90; but quotations are sometimes given as low as $3.30 for Stove, and $2.80 for Grate and Egg, alongside. "These are really no prices," says one, and so the rule is simply "do the best you can." Still, the extraordinary consumption in January affords encouragement on the part of producers, and hopes are still entertained that either through Gowen, of the Reading, or the Morgan syndicate some plan may be agreed upon which shall give stability to the trade. Meanwhile the Coal interests are suffering, and "hope deferred maketh the heart sick," as no engagements of any magnitude are probable until there are more definite developments. The total amount of Anthracite Coal sent to market for the week was 680,958 tons, compared with 503,732 tons in the corresponding week last year. The total amount of Anthracite mined thus far in the year 1886 is 3,550,550 tons, compared with 2,489,819 tons for the same period last year, an increase of 1,060,731 tons. As to the accumulation supposed to be taking place at tidewater, reports are contradictory.

The Bituminous Coal trade have arranged their pool for the current year, as already stated, and were to have perfected the details yesterday at a meeting in Philadelphia. Soft-Coal miners are agitating for an advance of 10¢ ₱ ton in wages, to affect both the Cumberland and Clearfield regions. The shipments from the mines of the Cumberland Coal region for the week ended Saturday, February 12, were 29,598 tons, and for the year to that date 225,593 tons, a slight increase compared with last year.

A machine for making tubes from hollow cylindrical metal ingots by either hot or cold rolling has been patented by S. P. M. Tasker, of Philadelphia, Pa. In conjunction with a set of concave rolls, so arranged that the rolls cross each other, there is employed a mandrel which is adapted to be rotated with the ingot upon it. The mandrel is of the length at least of the tube to be formed. It is passed through the pass of the set in a direction at right angles to its common axis. The substance of the ingot is compacted and consolidated upon the mandrel by the action of the rolls. After a sufficient number of repeated passes the ingot is thinned out or reduced in thickness, and is elongated until the required proportions are attained. The revolving progressive motion to which the ingot is subjected is said to prevent finning or irregularities of any kind, and to produce a uniformly cylindrical and very marketable tube.

The San Francisco *Call* of February 24 says: "John Spreckels, of the Oceanic Steamship Co., who recently went East to make arrangements for building a new steamer, has purchased from Pearce & Co., of London, the steamers Zealandia and Australia, now plying between San Francisco, Honolulu, Australia and New Zealand, and chartered by the Pacific Mail Steamship Co. The price paid is said to have been $500,000."

Trade Report.

New York Iron Market.

American Pig.—The market is quiet and firm, without any features of special interest. The consumption of Foundry Irons is fair for the season, with exceptional cases of great activity on the one hand and complete idleness on the other. Sales are confined almost entirely to small lots to cover prompt requirements, and in the aggregate are quite satisfactory in quantity. Some of the furnaces are pretty well sold up on No. 2 Foundry, and in some instances Southern furnaces have given their representatives here instructions not to press sales, but to confine themselves to supplying regular customers. The Coke strike in the West is practically ended. We quote for standard brands, tidewater delivery, $18 @ $18.50 for No. 1 X Foundry, $17 @ $17.50 for No. 2 X Foundry, and $16 @ $16.50 for Gray Forge. Outside brands are 50¢ below these quotations.

Scotch Pig.—The arrivals thus far this year are heavier than they were a year since. The market is quiet and featureless. We quote nominally as follows for small lots: Coltness, $20.50 @ $21 to arrive; Gartsherrie, $20 @ $20.50 to arrive; Shotts, $20.50 @ $21 to arrive; Carnbroe and Glengarnock, $19.50 to arrive; Summerlee, $20 @ $20.50 to arrive; Dalmellington, $19 @ $19.50 to arrive; Eglinton, $18 @ $18.50 to arrive, and Clyde, $18.50 @ $19 to arrive.

Bessemer Pig.—We hear of the sale to one mill of 20,000 tons of Bessemer Pig, Foreign or Domestic, to be delivered at the option of the seller. Foreign is now nominally $19 @ $19.25, ex-ship, figures which Domestic furnaces undersell.

Spiegeleisen.—The market is very quiet and weaker. Twenty % English Spiegeleisen is nominally quoted $27, and German $26.50. Ferromangenese is quoted $67.50 @ $68 for 80 %.

Bar Iron.—Very little business has been done during the current week. We quote for delivery here in round lots: Common Iron, 1.65¢ @ 1.70¢; Medium, 1.70¢ @ 1.75¢, and Refined Iron, 1.85¢ @ 1.9¢, with half extras. Store prices are 1.75¢ @ 1.80¢ for Common, 1.85¢ @ 1.90¢ for Medium, and 1.9¢ @ 2.2¢ for Refined.

Structural Iron.—We hear of the closing of a contract for about 2000 tons of Steel Beams, for the largest building yet erected in Chicago. We quote for Angles 2¢ @ 2.10¢, delivered, and Tees at 2.35¢ @ 2.40¢ for round lots. Steel Angles are quoted 2.35¢ @ 2.45¢, according to quality. Store quotations remain 2.25¢ @ 2.4¢ for Angles, and 2.6¢ @ 2.7¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders.

Plates.—We quote for round lots: Common or Tank, 2¢ @ 2.1¢; Refined, 2¼¢ @ 2⅜¢; Shell, 2.4¢ @ 2½¢; Flange, 3.4¢ @ 3½¢; Extra Flange, 4¢ @ 4¼¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2½¢ at mill asked; Boiler, 3¼¢ for Shell, 3¾¢ @ 4¢ for Flange, and 4¼¢ @ 5½¢ for Extra Flange and Fire-Box.

Merchant Steel.—We print below the revised classification adopted. Quotations for the range from ordinary to good grades are as follows: American Tool Steels, 7½¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; English Tool, 13¢ @ 15½¢; common grades, 7¢ @ 9¢; Crucible Machinery, 4.5¢ @ 6¢; Round and Flat Spring, 2.6¢; Round-Edge Tire, 2.6¢; Square-Edge Tire, 2.9¢; Toe Calk, 2.7¢; Sleigh Shoe, 2.8¢; Open-Hearth and Bessemer Machinery, 2.8¢, with freight allowance.

Steel Wire Rods.—What little business is doing is for prompt delivery. We quote $41.50 @ $42.

Steel Rails.—The market has been very quiet, sales being confined to small lots. There are a number of inquiries for 5000 and 6000 ton blocks in the market, but none have been closed thus far, buyers holding off. For spring delivery the market is firm at $34 @ $34.50, the majority of the mills finding it difficult to manage deliveries.

Scrap.—The market is weaker. We note a sale of 300 tons of Foreign Scrap at $20.50 ex ship. We quote from yard for No. 1 Wrought $21 @ $21.50.

Old Rails.—The principal features of interest are the very heavy offerings of both Foreign and American Rails. In the West at least one large block is on the market; from the South several large lots are offered for immediate shipment, and one or two roads tributary to this market are also seeking buyers. There have been arrivals of Foreign T's from Antwerp and English Double Heads, and the quantity of the latter in store in this city is reported to be quite heavy. Holders generally ask $22.50 for D. H.'s, but bids do not go higher than $22 @ $22.25, and no sales are reported this week. It is urged in behalf of holders that with prices abroad D. H.'s cannot be laid down here at less than $22.50; that sales below that figure involve a direct loss, and that it is out of the question to offer them for shipment at less than that, so that the supply is made to appear larger than it is really likely to be. Against that it should be noted that spring is approaching, and that with it large amounts of Old Rails will come up. At present the principal consumers seem well supplied and are holding off.

Rail Fastenings.—Speculative lots are still on the market. Street Railroad Spikes have been offered at $2.25 this week without securing the business. We quote Spikes nominally 2.40¢; Angle Fish Bars, 2¢; Bolts and Square Nuts, 3¢, and Bolts and Hexagon Nuts, 3.25¢, delivered.

The following is the revised classification of Steels and extras adopted on the 12th inst. by the Steel Association of the United States:

TOOL STEEL.

Round, Square and Octagon.

	Per ℔ extra.
⅝ to 2	Base
2⅛ to 3 and 7-16 to ⅝	1.0¢
3⅛ to 4	1.5¢
4⅛ to 5 and 5-16 to 11-32	2.0¢
5⅛ to 6	2.5¢
6⅛ to 7 and ¼ to 9-32	3.0¢
7⅛ to 8	3.5¢
11-16 to ½	0.5¢
3 16	5.0¢
5-32	10.0¢
1/16	18.0¢

Flats.

⅝ x ⅝ and ⅝ x 9-16	Base
2 to ⅝ inches wide x 2 to ⅝ inches thick	Base
	Per ℔ extra
8 x 8 and 8 x 7	3.5¢
8 x 6 and 8 x 5	2.5¢
8 x 4	2.0¢
8 x 3, 8 x 2 to ⅝, and 8 x 1/16	1.0¢
8 x ¼	2.0¢
8 x 1/16 and 7 x 7	3.0¢
7 x 6	2.5¢
7 x 5 and 7 x 4	2.0¢
7 x 3	1.5¢
7 x 2 to ⅝, 7 x 1/16 and 7 x ¼	1.0¢
7 x 1/16 and 6 x 5	2.0¢
6 x 6	2.5¢
6 x 4 and 6 x 3	1.5¢
6 x 2 to ⅝, 6 x 1/16 and 6 x ¼	1.0¢
6 x 1/16 and 5 x 5	2.0¢
5 x 4	1.5¢
5 x 3, 5 x 2 to ⅝, 5 x 1/16 and 5 x ¼	1.0¢
5 x 1/16	2.0¢
4 x 4	1.5¢
4 x 3, 4 x 2 to ⅝, 4 x 1/16 and 4 x ¼	1.0¢
4 x 1/16	2.0¢
3 x 3 to ⅝, 3 x 1/16 and 3 x ¼	1.0¢
3 x 1/16	2.0¢
2 to ⅝ x 1/16	1.0¢
2 to ⅝ x ¼	1.5¢
2 to ⅝ x 1/16	2.0¢
⅝ x ½, ⅝ x 7-16 and ⅝ x ⅝	1.0¢
⅝ x 5-16 and ⅝ x ¼	1.5¢
⅝ x 3-16 and ⅝ x 1/16	2.0¢
½ x 1/16, ½ x 7-16 and ½ x ⅝	1.0¢
½ x 5-16 and ½ x ¼	1.5¢
½ x 3-16	2.0¢
½ x 1/16	3.0¢
7/16 x ⅜	1.0¢
7/16 x 5-16	1.5¢
7/16 x ¼	2.0¢
7/16 x 3-16	3.0¢
7/16 x 1/16	4.0¢
5-16 x 5-16 and 5-16 x ¼	2.0¢
5-16 x 3-16	4.0¢
5-16 x 1/16	8.0¢
¼ x ¼	3.0¢
¼ x 3-16	5.0¢
¼ x 1/16	15.0¢
3-16 x 3-16	5.0¢
3-16 x 1/16	20.0¢

All unenumerated sizes will be charged at price of next larger dimension in list.

CRUCIBLE STEELS.

Crucible Machinery—Rounds and Squares.

	Per ℔ extra.
¾ to 3 inches	Base
3⅛ to 4 inches and ⅜ to 7-16 inch	0.5¢
4⅛ to 5 inches and 5-16 and 11-32 inch	1.0¢
5⅛ to 6 inches and ¼ and 9-32 inch	1.5¢
⅛ to 11-16 inch	0.2¢
3-16 inch	3.0¢

Flats and Octagons, ⅛ cent extra throughout the list. Cutting to multiple of specified lengths, ⅛ cent per pound for anything over 24 inches long. For lengths 24 inches or less, according to special contract.

Crucible Bessemer and Open-Hearth Spring Steel, Flat.

	Per ℔ extra.
1¼ to 4 inch x No. 4 gauge to ⅛ inch inclusive	Base
1 and 1⅛ inch x No. 1 gauge to 4 gauge, inclusive	0.2¢
1 to 3 inch x No. 5 gauge to 7 gauge, inclusive	0.5¢
⅛ to 3 inch x No. 8 gauge to 10 gauge, inclusive	1.0¢
¾ to 3 inch x No. 11 gauge to 16 gauge, inclusive	2.0¢
¾ to 3 inch x No. 17 gauge to 20 gauge, inclusive	3.5¢
⅜ to ⅝ inch x No. 10 gauge to 16 gauge, inclusive	4.0¢
⅜ to ⅝ inch x No. 17 gauge to 20 gauge, inclusive	5.0¢
⅜ to ⅝ inch x No. 21 gauge to 24 gauge, inclusive	6.0¢

Crucible cut to length, 24 inches and over, ¼ cent per pound extra; and under, according to special contract.

Bessemer and Open-Hearth cut to length, 24 inches and over, 1-10 cent per pound extra; and under, by special contract.

Round and Square Crucible Spring Steel.

	Per ℔ extra.
⅝ to 1⅛ inches	Base
⅛ to 9-16 inch	0.2¢
⅝ to 7-16 inch	0.5¢
5-16	1.0¢
¼	1.5¢

BESSEMER AND OPEN-HEARTH STEELS.

Machinery Rounds and Squares.

	Per ℔ extra.
¾ to 3 inches, inclusive	Base
3⅛ to 4 inches, inclusive, and ⅜ to 7-16 inch, inclusive	0.3¢
4⅛ to 5 inches, inclusive, and 5-16 and 11-32 inch, inclusive	0.5¢
5⅛ to 6 inches, inclusive	1.0¢
⅛ to 11-16 inch, inclusive	0.2¢
¼ and 9-32 inch, inclusive	0.7¢
Machine cutting to specified lengths above 24 inches	0.2¢
Machine cutting to specified lengths 12 inches to 24 inches	0.4¢

Machine cutting to specified lengths less than 12 inches according to contract, but not less than 0.6 cent extra on each size.

Shearing or Sawing, one-half of the above extras for cutting.

Machinery Flats.

	Per ℔ extra.
1¼ inches and wider x ⅜ to 1 inch thick	Base
1¼ inches and wider x ¼ to 5-16 inch thick	0.1¢
1¼ inches and wider x 5-16 and 7-32 inch thick	0.2¢
1¼ inches and wider x ⅜ and 5-32 inch thick	0.3¢
⅝ inch to 1⅛ inches x ¼ to 1 inch thick	0.2¢
⅝ inch to 1⅛ inches x 3-16 and 7-32 inch thick	0.3¢
⅝ inch to 1⅛ inches x ⅛ and 5-32 inch thick	0.5¢
⅝ inch to ⅝ inch x ¼ to ⅜ inch thick	0.3¢
⅝ inch to ⅝ inch x 3-16 and 7-32 inch thick	0.5¢
⅝ inch to ⅝ inch x ⅛ and 5-32 inch thick	0.7¢
⅝ inch to 1⅛ inches x 1-16 and 3-32 inch thick	2.0¢
1¼ inches to 3 inches x 1-16 and 3-32 inch thick	1.0¢

Tire Steel, Round Edges.

1¼ inches and wider x ⅝ to 1 inch thick ..... Base
Extras same as Flat Machinery Extras.

Tire Steel, Square Edges.

Throughout the list 0.8 cent more than for same sizes of Round Edge Tire.

Toe-Calk Steel.

1¼ inches and wider x ⅝ to 1 inch thick ..... Base
Extras same as Flat Machinery Extras.

Sleigh-Shoe Steel.

1¼ inches and wider x ⅜ to 1 inch thick ..... Base
Extras same as Flat Machinery Extras.

Spring Steel, Flat.

	Per ℔ extra.
1¼ to 4 inch x No. 4 gauge to ⅛ inch inclusive	Base
1 and 1⅛ inch x No. 1 gauge to 4 gauge, inclusive	0.2¢
1 to 3 inch x No. 5 gauge to 7 gauge, inclusive	0.5¢
⅛ to 3 inch x No. 8 gauge to 10 gauge, inclusive	1.0¢
¾ to 3 inch x No. 11 gauge to 16 gauge, inclusive	2.0¢
¾ to 3 inch x No. 17 gauge to 20 gauge, inclusive	3.5¢
⅜ to ⅝ inch x No. 10 gauge to 16 gauge, inclusive	4.0¢
⅜ to ⅝ inch x No. 17 gauge to 20 gauge, inclusive	5.0¢
⅜ to ⅝ inch x No. 21 gauge to 24 gauge, inclusive	6.0¢

Bessemer and Open-Hearth cut to length, 24 inches and over, ¼ cent per pound extra; and under, by special contract.

Round Spring Steel.

	Per ℔ extra.
⅝ to 1¼ inches	Base
⅛ to 9-16 inch	0.2¢
⅝ to 7-16 inch	0.5¢
5-16 inch	1.0¢
¼ inch	1.5¢

Ovals and Half Ovals, Half Rounds and Special Shapes subject to special agreement, but at prices not less than Rounds of same weight per foot.

Metal Exchange.

The following sales are reported:

WEDNESDAY, February 17.

300 tons Pig Iron Certificates, March	$17.50
10 tons Tin, March	20.55¢
12,500 ℔ Lake Copper, April	11.50¢
32,500 ℔ Lead, April	4.70¢

FRIDAY, February 19.

5 tons Tin, February	20.70¢
25 tons Chili Bars, June	£41
32,500 ℔ Lead, May	4.75¢

SATURDAY, February 20.

10 tons Tin, April	20.60¢
10 tons Tin, April	20.65¢

TUESDAY, February 23.

5 tons Tin, March	20.65¢
5 tons Tin, April	20.65¢
50,000 ℔ Lake Copper, May	11.50¢

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, February 23, 1886.

The general feeling has been one of dullness and comparative inactivity during the past few days, but, so far as can be seen, there is nothing to counteract the favorable reports given for several weeks past. The volume of business is steadily enlarging, and although purchases of Iron and other material have fallen off somewhat during the current month there has been no accumulation, so that buyers are likely to be in the market quite as soon as sellers are ready for them. Advances in prices have been a little uneven, however, and it is not unlikely that the pause in the upward movement is to give the laggards a chance to catch up. The advance in Finished Iron of all kinds is quite out of proportion to that in Pig Iron and Old Material and other articles that might be named, but there is no reason to suppose that this condition of affairs will be of long duration, or that other articles will recede to the level of Finished Iron. Looking beyond to day's market, there is nothing whatever likely to call for a modification of the favorable opinions so frequently expressed, so that renewed activity and additional firmness are believed to be a question of only a few days' time. Consumption will be the controlling influence and in regard to that there is only one opinion, viz., large and steadily increasing.

Pig Iron.—The market has been somewhat quiet of late, but the supply is extremely light, particularly of good Mill Irons. Prices have been firmly maintained, and anything like a brisk demand would easily carry prices to $17 at tide for standard makes of Gray Forge, and $19 for No. 1. These are, in fact, the asking figures, and concessions of 25¢ to 50¢ ℔ ton are regarded more as a favor to buyers than as a necessity on the part of sellers. Some quote lower prices, but, as they have little or nothing for sale, such quotations make very little difference. Makers of Pig Iron are not anxious to crowd prices higher than warranted by the increase in cost of production, and, although some further advance is almost certain before midsummer, the feeling is extremely conservative, and anything like a speculative movement would be severely sat down upon. An upward movement in Finished Iron is considered more desirable, but if there should be a scarcity of Pig Iron makers are not likely to wait for Finished Iron to advance before putting up their prices. On the whole, therefore, considering the steady increase in consumption, both present and prospective, and the extremely limited stocks on hand, we incline to the opinion that prices will remain firm, and probably work somewhat higher, providing no unfavorable developments are presented within the next two or three weeks. Sales during the week at $16.50 @ $17 at tide for Gray Forge, $17 @ $17.50 for No. 2 Foundry and $18.50 @ $19 for No. 1, choice brands about $1 more, with quite a strong feeling on all good brands. Sales of upward of 20,000 tons Bessemer have been made on private terms, but understood to be at about $19 at furnace. This Iron is to be made chiefly from Foreign Ore, and is to be similar in quality to West Coast Hematites.

Foreign Iron.—There is some inquiry for Bessemer Pig, with bids at $19. Philadelphia or Baltimore, for 10,000-ton lots. One or two large lots have been taken recently at something over $19, but the exact figures have not transpired. Sellers ask $19.50 @ $19.75 for Bessemer and $27 @ $27.50 for 20 % Spiegel.

Blooms.—Domestic Blooms are in better demand, and about $1 ℔ ton dearer. Sales a the following quotations: Charcoal Blooms $53 @ $54, Runout Anthracite, $43 @ $44, Scrap Blooms, $33 @ $34. and Ore Blooms, $35 @ $36.

Bar Iron.—A fair amount of business is passing from day to day, but for some reason or other prices do not improve as they ought. There is no scarcity of work at any of the mills, and, although the prospect of its continuance is entirely satisfactory, competition is so close that recent quotations are barely maintained. Much surprise is expressed at this condition of affairs, because the cost of production is gradually increasing and likely to continue in that direction, and with at least a full average demand there ought to be no difficulty in maintaining firm quotations. Buyers take advantage of this feeling, and on large lots stand out for concessions of 2½¢ @ 5¢ from quoted rates, which are 1.85¢ @ 1.9¢ for Best Refined Bars, and 1.7¢ @ 1.75¢ for medium quality. Skelp Iron has been in good demand, and several hundred tons sold at about 1.85¢, with 1.85¢ @ 1.87½¢ asked.

Muck Bars.—There is a fair demand, but the offerings are somewhat larger, so that prices are easy as last quoted, viz., $29 @ $29.50 at mill.

Plate and Tank Iron.—Something of the same feeling prevails in the Plate trade, but with more orders on hand and a large amount certain to come on the market in course of the next two or three weeks sellers are more inclined to advance than to shade prices. The shipyards are all taking in a great deal of work, and, in addition to orders for Plates placed last week, 2000 or 3000 tons more will be wanted almost immediately. This, with a good average demand from other sources, will keep the mills fully employed, and for the present insures full prices as follows: Ordinary Plate, 2¢ @ 2.1¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Shell, 3.25¢; Flange, 3.5¢; Fire-Box, 4¢.

Structural Iron.—Nothing of importance has come on the market recently, the demand being for lots of 100 to 200 tons each, or from that downward. There is a great deal of work on hand, however, and the mills are all running full, and in some cases are rather hurried to make deliveries as quickly as required. Prices are steady and unchanged, as follows: 2¢ @ 2.05¢ for Angles; 2.1¢ @ 2.2¢ for Bridge Plate; 2.4¢ @ 2.5¢ for Tees, and 3¢ for Beams and Channels.

Sheet Iron.—Business has been rather quiet of late, owing partly to the determination of manufacturers not to accept the prices offered for large lots. The increase in cost of production and the certainty that it cannot be reduced lead to the conviction that higher figures will ultimately prevail, so that for the time being they are quite content with such business as may be offered at about the following prices:

Best Refined, Nos. 26, 27 and 28	4 ¢
Best Refined, Nos. 18 to 25	3¾¢
Common, ¼¢ less than the above.	
Best Bloom Sheets, Nos. 26 to 28	5 ¢
Best Bloom Sheets, Nos. 22 to 25	4½¢
Best Bloom Sheets, Nos. 16 to 21	4 ¢
Blue Annealed	3 ¢
Best Bloom, Galvanized, discount	60 %
Common, discount	65 %

Steel Rails.—There is no change to be noted this week; the demand is fair, and as there are a great many orders on hand prices are firmly maintained. Prospects are extremely bright in this branch of trade, and not the slightest doubt is felt in regard to the summer's trade, either as to prices or volume of business. Sales on the basis of $34 @ $34.50 at mill, and from that to $35 for small lots.

Old Rails.—There has been very little business of late, owing to scarcity, but prices are considered a little toppy, and buyers are not disposed to bid within a dollar of the asking prices, which are $22 for foreign shipments and $23 @ $23.50 for spot lots.

Scrap Iron—Scarce and firm at about the following quotations: No. 1 Wrought Scrap, $20 @ $22; No. 2 do., $14 @ $15; Turnings, $14 @ $14.50; Old Car Wheels, $16 @ $16.50; Old Steel Rails, $20; Fish Plates, $23.50 @ $24.50; Cast Scrap, $14.50 @ $15; do. Turnings, $10 @ $10.50.

Wrought-Iron Pipe.—The market is in the quiet state reported for some weeks back. Demand has fallen off to some extent, and new contracts and large orders are not looked for at present. Some of the mills are still busy finishing up back orders, but immediate sales are in small lots for jobbing and repairing purposes. In the meantime discounts remain firm at last week's quotations for large lots, viz: Lap-Welded Black, 60 %; Butt-Welded Black, 42½ %; Butt-Welded Galvanized, 32½ %; Lap-Welded Galvanized, 42½ %; Boiler Tubes, 55 %.

Nails.—The market is still in a waiting state, although shipments have increased during the week. The business done is generally in small lots for near-by consumption. There is no disposition to force sales, as the mills are not anxious to book orders for future delivery at present rates. Prices are firm at last week's quotations, viz., $2.50, with 10¢ ℔ keg rebate for large lots.

Hardware.—The activity developed a week or two ago still continues, and manufacturers and jobbers report a good demand. Dealers appear to have realized the necessity for better prices, and therefore advances are steadily maintained. The recent increase in Screws has had the effect of stimulating the demand, and sales have been on a larger scale during the week. The trade feel confident of further good business as the weather gets warmer and outdoor work begins.

Wood-Working Machinery.—Manufacturers report a steady business. Orders are coming in very freely for new work, and, old stocks being pretty nearly exhausted, the new orders assure plenty of business for some time to come. Prices continue about the same as for many months back, but there is less difficulty in securing the work.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, PA., February 23, 1886.

The collapse of the Coke strike came suddenly. Although not altogether unexpected, it had been thought for a couple of weeks past by those who were well posted and had given the matter attention that the end was not far off and that the strikers would have the best of it. Public sentiment, for various reasons, was against the operators, and their course was pretty severely censured by the press generally. However, now that the contest is ended, it is hoped that general business will improve. The railroads will be the first to be benefited, as, in addition to the movement of Coke, furnaces will soon be ordering supplies of Ore, Limestone, &c., and directly as well as indirectly a great many men now idle will be furnished employment. Another event of the past week was the action of the Junction Nail Works, at Mingo, Ohio, in effecting a compromise with their striking nailers. The president of this company, Mr. Samuel Laughlin, was a member of the Western Nail Association and one of the conference committee of the same. His action is strongly censured by the manufacturers generally, who claim that he acted in bad faith, and at a special meeting of the association in this city on Saturday last Mr. Laughlin's name was dropped from the membership. Mr. Laughlin feels that he has good cause for doing what he did, although there is no doubt but this compromise has damaged to some extent the position of the manufacturers in connection with the strike and strengthened the strikers. The association, at the meeting on Saturday, passed a strong resolution reaffirming their determination to fight it out, notwithstanding the action of Mr. Laughlin. Another important event of the past week was the shipment of some 10,000,000 bushels of Coal to the down-river markets, a large proportion of which goes through to New Orleans and other points South. Pittsburgh Coal is cheaper at Cincinnati than for many years, and this large shipment South will ease up the Southern market, in which stocks had been considerably reduced. A strong effort is being made to have the National Government buy out the Monongahela Navigation Co., and make the Monongahela River free of lockage, which is a source of great annoyance to the river Coal operators, who say they cannot pay it and meet competition in down-river markets. The Coal trade of the Monongahela Valley is immense, and is next in importance to Pittsburgh to the Iron trade.

Iron Ore.—Now that the Coke strike has terminated the outlook is better, as a number of furnaces now banked up will be started up again and there will be more Ore wanted, although some furnaces have considerable Ore on hand. There will no doubt be a large influx of Ore brokers within the next week or two; they realized that it was useless to come here as long as the Coke strike held out.

Pig Iron.—An easier tone characterizes the market, although there is not much prospect of a decline. The cost of production, instead of being reduced, is being increased; nearly all the furnaces here and hereabouts have advanced the wages of employees 10 per cent., and it is rumored that the price of Coke will be advanced. This being the situation, there is not likely to be any decline in the price of Pig Iron, though several furnaces that have been banked up will soon start again. It must be borne in mind that a good many furnaces have contracts that will absorb their production for from 30 to 60 days to come. The indications are that the market will remain about where it is for some time to come. Consumers can pay no more as long as there is no improvement in the price of Finished Iron, and producers cannot sell for less until the cost of production can be reduced, of which there is not much prospect at present. We quote as follows:

Neutral Gray Forge	$16.00 @	$16.50,	4 mos
All-Ore Forge	17.00 @	18.00,	4 "
White and Mottled	15.25 @	15.75,	4 "
No. 1 Foundry	17.50 @	18.00,	4 "
No. 2 Foundry	16.50 @	17.00,	4 "
Cold-Blast Charcoal	25.00 @	27.00,	4 "
Bessemer Iron	20.00 @	20.50,	4 "

Some sales of Bessemer Iron have been made by furnaces in the Mahoning Valley the past week at $20.50, cash, delivered at Cleveland, and St. Louis is reported as having sold some 7000 tons at $20.50, cash, deliverable at Joilet, Ill.

Muck Bar—Continue quiet; we are reported sales at $27.50 @ $28, cash, at mill—the latter is considered an outside price.

Manufactured Iron.—The situation remains substantially the same as a week ago; trade continues light for the season, but an improved demand is looked for next month. However, manufacturers complain more in regard to prices than lack of demand; but until orders come forward more freely there is not likely to be much, if any, improvement in prices. We continue to quote Bars at 1.70¢ @ 1.75¢, 60 days, 2 % off for cash, for first-quality Iron.

Nails.—The situation so far as it relates to the strike is not as satisfactory to the manufacturers as it was a week ago, the compromise at the Junction Nail Works having unsettled matters considerably, and it is difficult to foretell at present what the

outcome will be. Pittsburgh has been out of the market, not a single machine having been in motion, since last June. As stated elsewhere, the Western Nail Association, notwithstanding the compromise in question, express the determination to stand by the position taken from the first, and they still have a chance to carry their point, notwithstanding they are not as strong as they were prior to the compromise in question.

Wrought-Iron Pipe.—There is a continued good degree of activity; mills are all in operation, and the outlook for a big spring and summer trade never was better. No change in prices. Discounts on Black Butt-Welded Pipe in carlots and upward, 45 %; less than a carload, 42½ %; do, Galanized, 35 % in carlots, and 32½ % for less; Black Lap-Welded Pipe in carlots, 62½ %, and 60 % for less; Galvanized do. in carlots, 45 %; less than a carload, 42½ %; Boiler Tubes, 55 % off regular list; Two-inch Oil Well Tubing, 13¢ ℔ foot, net; 5⅝-inch Casing, 40¢; 8-inch Drive Pipe, $1.30.

Old Rails.—Old Iron Rails continue dull and prices weak; we quote at $24 @ $24.50. The largest consumers here are well stocked and for the time being out of the market, and it may be stated in this connection that with fewer buyers there are more sellers. Steel Rails quotable at $22.50 @ $23 for Short or Mixed Lengths and $24 for Long Lengths.

Railway Track Supplies.—It is reported that there will be a considerably increased demand within the next few weeks, or as soon as the weather becomes favorable for outdoor work. Prices remain unchanged. Spikes, 2.40¢, 30 days, delivered. Splice Bars, 1.70¢ @ 1.75¢; Track Bolts, 2.75¢ with Square and 2.85¢ @ 3¢ with Hexagon Nuts.

Steel.—There is some inquiry for Bessemer Steel Nail Slabs, and the market may be quoted firm at $32 @ $33 ℔ ton; Bessemer Blooms and Billets, $33 @ $35; Rail Ends, $23 @ $23.50; Bloom Ends, $22.50 @ $23.

Steel Rails.—There has been no change in the position of the market here for some time past. Both mills have all they can do, and Heavy Sections are quoted steady at $35 @ $35.50, cash, at mill.

Old Material.—No. 1 Wrought Scrap is scarce and in demand; quoted steady at $20 ℔ net ton; Wrought Turnings, $14 @ $15; Old Car Springs, $24 @ $25; Cast Borings, $12, gross ton. In regard to Old Car Wheels, the market is unsettled; we hear of sales at $16 and also at $17, gross ton—the latter is nearer the market than the former.

Chicago.

Office of *The Iron Age*, 36 and 38 Clark St., Cor. Lake St., CHICAGO, February 22, 1886.

Hardware.—The prominent features for the week were the increased demand for all lines of spring goods and the change in price lists on Screws. Jobbers have been working for a uniform list for several years, and its adoption is received with satisfaction. It is said that the new scale makes the average net price a trifle higher than before. While it is noted that manufacturers are stiffening up on prices, there is considerable cutting between leading jobbing houses on Steel Goods, Wire Cloth and other articles sold for future shipment. On Shelf Goods prices are reported steady and demand rapidly increasing. Orders for Heavy Hardware and general Farming Implements are placed more freely than customary in the month of February. Jobbers further West and railroads are still in conflict on the freight question, and the recent breakage in the trunk-line passenger rates to the extreme West lends interest to the controversy. Competition between jobbers further West and Chicago and St. Louis jobbers is becoming more serious each year, and consequently results in shorter profits.

Barb Wire.—Following upon our statement of last week that makers, brokers and jobbers were not a unit on price and the manner of trading comes the announcement by jobbers that they are selling Painted Wire at 3¼¢ and Galvanized at 4¼¢ in small lots. Some of the jobbers contend that these prices would be bottom for carload quantities, but there are others who are unwilling to bind themselves to these figures. Unless prices adopted by manufacturers can be enforced among brokers, and the trading of Plain Wire to manufacturers and taking pay therefor in Barb Wire is dispensed with, and straight deals made in the entire market, there are likely to be frequent irregularities which will keep the trade in a constant turmoil. We learn from a prominent jobber in St. Louis that the unlicensed manufacturers of that district have all (perhaps with one exception) become licensees of the Washburn & Moen Co. in the last 10 days. In order to protect prices and regulate the sale of Wire a local association is about being organized, which in its character is supposed to be similar to the one recently inaugurated in this city. An effort is on foot to have the two organizations co-operate in all movements, with a view of the better controlling the trade in the West. A meeting of the manufacturers is announced for this week, at which time a number of complaints will be discussed and remedied if possible.

Nails.—Jobbers continue to ask $2.55 for Iron Nails in small lots, and $2.75 for Steel Nails. This price, however, cannot be given as the uniform market price, as they are shaded from 5¢ to 10¢ ℔ keg by the regular jobbing trade, and the claim is made that even those prices are shaded. Legitimate jobbers, however, do not compete for trade against scalpers who disregard the actual value based upon present cost. When we see flaring announcements posted over the doorway that Nails are sold "at less than factory prices," it would be unjust to the buyer to claim a steady and firm market at present figures. The announcement that a Nail mill of the Junction Iron Co. was about to start cutting Nails on a compromised scale has considerably disturbed both makers and jobbers in this vicinity. The later announcement that the company have been thrown out of the nail-makers' association has somewhat decided the trade that a general resumption would not occur, and the market is likely to become more steady within the next few days. Stocks are reported in good shape, with some few odd sizes short.

American Pig Iron.—There is no doubt that the quietness which has now continued in the Pig-Iron market for the past three weeks is giving makers and sales agents considerable anxiety. Scarcely two persons who are in a position to know the exact situation can be found who agree upon the subject in all its phases. Every effort is being put forth to support the price which was reached in December and January, and the labor troubles in the Coke regions have figured extensively in their arguments. After clearing the surface of the "ifs" and "ands" there will be found at the bottom grave apprehensions that lower prices will be made, regardless of all features that have conspired to support the market during this time. In the last two weeks furnaces have been banked, makers have been ostensibly loth to make sales, and yet all the demand that has come into the market was readily supplied. In addition thereto, in a quiet way orders have been sought for with fully as much energy as, if not more than, was shown when buyers were more anxious to obtain Iron than at the present time. The latest information being to the effect that the coke-drawers' strike is ended, the strongest prop that it has had is knocked from under, and unless an increased consumption comes rapidly forward the chances are that the market will be ess firm than in the past 30 days. On sales of small lots of Coke Iron made during the past week we quote $19.50 @ $20 for No. 1, and $18.75 @ $19 for No. 2 and Cinder Mixed. There has not been a very heavy demand for Charcoal Irons, and present quotations would be about $22.50 @ $23 for Nos. 1 and 2, with the higher numbers ranging 50¢ above these figures. On Ohio Scotch Irons there appears to be an increased inquiry, and the authentic statement that these Irons are scarce has induced consumers to look after the price and quantity of imported Irons. This, it is believed, however, is more upon the basis of an emergency than for present requirements. Thus far there has been no difficulty in supplying consumers with all that was required, and Standard Blackbands are quoted at $22 for the best grades, with one or two that could be had at a shade below this figure. There has been no improvement in the market for Southern Irons, and we hear of no sales of consequence. There does not appear to be any special effort on the part of furnacemen to sell Iron, and it is believed that the prices that they would need to obtain and allow them a profit make it impossible to dispose of their Iron. We quote for the best grades of Southern No. 1 Foundry, $19.50; No. 2, $18.75 @ $19; No. 2½, $17.75 @ $18.50, as a nominal price. It is said that all the furnaces in the Mahoning Valley at the present writing, with the exception of Briar Hill and Haselton, are banked, and the Neshannock Furnace the only one in blast in the Shenango Valley. Supposing this to be so, there appears to be plenty of Iron to meet the requirements of this market. Both of the Union furnaces, in this city, are banked.

Merchant Steel.—Several important orders that have come into the market the past week on low-grade Steels have brought the jobbing trade to believe that business is improving. The demand for small lots has been tolerably fair from consumers. Frequent irregularities are reported, and prices are regarded as weak. We make the following quotations from store: Open-Hearth and Bessemer Spring Steel at 2¼¢; jobbing rate, 2.6¢; Flat Machinery, 2½¢; Crucible Machinery, 5¢; Crucible Cast Plow Steel, 4½¢; Patented Plow Steel, 5½¢; Standard Tool Steel, 8¢; high grades, 8½¢ @ 13¢.

Steel Rails.—No inquiries of importance have been noted here recently and the market in all respects is quiet and uninteresting. Makers continue to quote $38 for first quality and $34.50 for seconds. There has been no desire to make further contracts on the part of mills in this vicinity in view of the unsettled condition of the fuel supply.

Plate and Tank Iron.—Jobbers report a fair trade in small lots, with an increased inquiry for future delivery. Brokers state that it is difficult to obtain prices from mills for immediate shipment, all claiming that they are full of work and more firm in their demands. We quote as follows from store: Tank Steel, 3¢; Flange do., 4¢; Fire-Box do., 4¼¢; Tank Iron, 2.40¢; Shell do., 2.85¢; Flange do., 4¢; Angles, 2¼¢.

Structural Iron.—The only important transaction was the letting of the Phœnix Building, in this city, to Messrs. Hough, Ketcham & Co., Indianapolis. About 450 tons of Beams and Channels will be required in its construction, with perhaps as much more in Cast-Iron Shapes. Nearly all of our local makers of Architectural Iron report that they are well supplied with work and have fair prospects of considerable trade in the near future. On prices we are unable to learn any change from those which we quote, but several other energetic journals annouuce that concessions are being made. These statements are emphatically denounced by those engaged in the business. We quote as follows from store: Beams and Channels, $3.50; T Iron, $3; Angle Iron, $2.50; Flitch Plates, $2.50; Frieze Plates, $2.70.

Black Sheets.—Dealers announce some improvement in the demand recently, while jobbers are making efforts to place orders for fall delivery. From prices which have been obtained from mill there is substantial reason to believe that the market is not any higher than it was a year ago. At this time there is a strong rivalry for orders in a quiet way, and from general appearances it is doubtful whether any advances will occur until a more pronounced feeling in consumption is shown. We renew the following quotations from store: Nos. 10 to 14, 2.60¢; No. 16, 2.80¢ @ 2.90¢; Nos. 18 and 20, 2.90¢ @ 3¢; Nos. 22 and 24, 3.10¢; Nos. 25 and 26, 3.20¢; No. 27, 3.30¢.

Galvanized Iron.—Jobbers state that there is absolutely nothing new in the way of trade, and that the demand has continued steady for the better grades, chiefly in the heavier numbers used by railroads and other heavy consumers. There is some increased inquiry from cornicemen for the lighter numbers, but we have not learned of any orders that have been placed beyond the small jobbing trade. We renew the following quotations from store: Juniata, 60 % off, and Charcoal 60 and 10 % off.

Bar Iron.—Jobbers have been talking higher prices for months, but not until the present time has there been any change made. They now quote 1.90¢ rates from store in small lots, and 1.80¢ @ 1.85¢ in carload lots, according to specifications, for out-of-town trade. On the part of jobbers there is an effort being made to firmly adhere to these quotations, but there is no uniformity in the views of makers on the subject. All agree that prices have been entirely below the market value, and that Iron could not be produced at the figures that have been made heretofore. Nevertheless, there are makers who are willing to accept orders at less figures than those we announce. How much these prices could be shaded from mill would depend largely upon the buyer and the quantity in demand.

Old Wheels.—There has been a noticeable decline in the demand recently, and buyers are showing more anxiety to dispose of stocks on hand. On small lots $17.50 @ $18 appears to be a fair market price, but round lots would not command much over $17.

Old Rails.—There is no activity in the demand, and stocks could be had at perhaps $21 for which $23 was demanded some time ago. The demand has fallen off very materially, and the recent open weather has brought into sight lots that were not marketable during January.

Scrap Iron.—The market on Scrap is still favorable in many ways to the seller, but the demand is not so pressing. Prices range from $19 to $20 for No. 1 Wrought on 100 ton lots, well selected. Mill Scrap has not been in demand, and nominal quotations for No. 1 are $14, and No. 2, $9.50; Old Car Axles, $22; Horseshoes, $22.75. We make the following quotations as dealers' purchasing prices: No. 1 Wrought, $14.50; Machinery, $13; Stove Plate, $8.50; Steel Tires and Wagon Springs, $13; Old Plows and Plow Steel, $9.50; Wrought-Iron Turnings, $10; Cast-Iron Borings, $7.50; Malleable Scrap, $7.

Pig Lead.—The position of the market as regards adequate supplies in the near future is unchanged. Sales during the week footed up some 600 tons Common and Refined brands, February and March, at from 4.60¢ to 4.65¢ and 4.70¢ bid for Corroding, but none is offering for spot or future. It is reported that Western consumers have placed orders in London for upward of 1000 tons for New York delivery, costing up to 4.90¢, with duty added. It is not probable that these purchases will come West, the intention no doubt being to hold and resell in New York against purchases in the West at possibly higher prices than are now current.

The Union Foundry Works has sold its interest in the Union Foundry and Pullman Car Wheel Works to the Pullman Palace Car Co. George M. Pullman was elected president, instead of N. S. Bouton, resigned. The office of the company will be removed to Pullman Building, corner Michigan avenue and Adams street, about March 1st. No other changes in the management of the business are announced.

Chattanooga.

Office of *The Iron Age*, Carter and Ninth Sts., CHATTANOOGA, February 22, 1886.

The condition of trade can only be described by repeating in substance the last report. There is no excitement in any particular line of business, yet everything is running full and all are having plenty to do. A subject worthy of comment is the condition of Southern labor compared with the laboring classes North of the Ohio River. So far not a ripple has transpired in the steady workings of all the Southern industries. Strikes or lockouts are unheard of in any of our manufacturing districts, and the same remark will apply to all the mining districts. Everything is working smoothly and satisfactorily. There has been considerable excitement during the last two or three weeks in real estate in this immediate vicinity, and prices have advanced from 5 % to 25 %. This may in some measure be accounted for by the fact of quite a large number of Northern capitalists coming here with large blocks of money and putting it in real estate. All of our banks are reporting a steadily-increasing business and fair collections, and anticipate a good run in the opening up of early spring business, which is now just upon us. During the past week no less than 51 Northern men were registered in our city, seeking locations for manufacturing sites, and quite a number of them were men of large means.

Pig Iron.—The result of the Coke strike in Pennsylvania is looked upon with much interest by our Pig-Iron producers. So far it has had but little effect upon prices—not as much as was anticipated—and now it appears to be the settled opinion that whichever way the strike ends there will be but little change in prices during the year. Sales are being made without any difficulty up to the capacity of the furnaces, and so long as remunerative prices are being received there seems to be but little cause of complaint. While it is true that most of the Southern furnaces are now making their Iron as cheap as it is possible for them to do, experiments are proving that there is still much room for improvement in Southern furnace fuel. The Eastern States are taking the usual amount of metal by way of the seaboard routes. The rates by these routes remain unchanged, and so far as is known there is no change anticipated.

Lumber.—The interest manifested in Southern Lumber is on the increase and prices are looking up all along the line. Several large tracts of timber lands have lately been purchased with a view of working them. There are mills now running in the South that are turning out 75,000 feet of Lumber for every working day of 10 hours; whereas a few years ago 5000 to 7000 feet per day was considered a good day's work, and, instead of the team and wagon as a means of transportation, all of the first-class mills are using branch railroad lines and steam motive-power.

Miscellaneous.—Many articles made now in this district are finding a market north of the Ohio River, and transportation will be very much facilitated after the first of June next, when all the leading lines South will be changed to the standard Northern gauge. Then a car can be loaded at the works and no transfer will take place and no breaking of bulk until it reaches its destination. This is looked upon by all the manufacturers as a very important item to them, and will add very much to their facilities in enabling them to make sales throughout the North and West.

Wm. Rose's cooperage works, in Chattanooga, were totally destroyed by fire on Saturday last. Total loss about $9000; insured for $2000. He will rebuild immediately on a more extensive scale, and put in machinery better adapted for the West India and South American trade, from which points he was beginning to have a large demand.

Birmingham.

BIRMINGHAM, Ala., February 22, 1886.

The commercial agencies report a considerable increase of business failures in the last 10 days. The falling off of business represented by this showing does not affect this immediate district. On the contrary, trade is brisker than it was a week ago. Increased business consequent upon railroad building is assured to Birmingham. Work was commenced to-day on the closing of the gap of 41 miles between the Coalburg and Columbus (Miss.) divisions of the Georgia Pacific Railroad. Contractors who had begun on the first 10 miles of this line last spring and were stopped by the money troubles have taken up their contracts again, and the rest of the work is to be let at once. Then some encouragement has come to business here from the letting of 66 miles—coming this way from Holly Springs, Miss., and reaching the Mobile and Ohio Road—of the Memphis, Birmingham and Atlantic's extension. The completion of the Georgia Pacific and the Memphis roads, besides affording two invaluable new avenues for general business, will no doubt facilitate the permanent solution of the freight-rate difficulties of the Iron trade.

Iron Ore.—The Ore trade is strikingly different hereabouts from what it may be presumed to be in the Northern districts, where furnaces are having to bank for want of Coke. More Ore was dug last week than ever before, and preparations are actively in progress to put our new Red Ore on the market in considerable quantities.

Pig Iron—Is stiffer than might have been expected, considering that there is no immediate prospect of cheaper transportation to the North and West. The furnace managers do not seem greatly disquieted by the accumulation of stock on their hands, the result mainly of a suspension of dealings with the West. The prices governing at the first of the year are still fairly well sustained on an average. Local buyers, indeed, find the market a little higher than it was two weeks ago. The signs are that one point (not of much consequence now, however) is to be conceded to the furnaces by the railroads—namely, the allowance of the old freight tariff on Iron sold below the advance of rates and not delivered. One topic for talk in the trade just now is another of the periodical visits of a representative of Mr. Samuel Thomas, of Pennsylvania, who owns a large tract of Iron land just out of Birmingham. This time, though, the prevailing sentiment in regard to Mr. Thomas' reputed intention of developing this property is mere curiosity—certainly no very confident expectation.

Finished Iron—At the same old nominal quotations is still a trifle weak, and the margin for manufacturers is quite as narrow as ever. Scrap Iron is stiff, 90¢ @ 95¢ being asked for No. 1 Railroad.

Chains.—The Birmingham Chain Works already find that they could sell more Chains than they can make, and their product cannot be increased much as yet, for delay of material is the principal trouble. The rolling mills here are not yet prepared to shape their Iron for them, and have to bring it from the East.

Coal and Coke.—Home custom is still giving the Coke ovens of the district about all they can do, and promises of new ones come from more than one prominent colliery. Steam Coals are selling better.

Lumber.—A preliminary step has been taken for the new Yellow Pine Lumber combination foreshadowed in this correspondence some time ago. The mill men of the State are to meet in Montgomery day after to-morrow. Prices tend upward constantly, with an unflagging demand.

Cincinnati.

FEBRUARY 22, 1886.

Pig Iron.—The market in the past week has been very quiet. The amount of business is reported to be about the same as in the week previous, the past week being characterized by want of inquiry from consumers. Foundries are being seriously trammeled in their work for want of the usual supply of Connellsville Coke. Furnaces in Ohio and West Pennsylvania are in the same condition, and it is thought that the forced consumption of foundry grades on that account will about equal the decline in production. It is not expected by either the producer or consumer that there will be any material change in prices, certainly not in the near future. It is generally reported that consumers find no difficulty in placing their orders for present and later delivery for either small or round lots at about present quotations. It may be correctly stated that the lower prices quoted in Eastern markets on American, English and Scotch Pig Iron cannot affect our market for Western and Southern makes in the West. The East Pennsylvania and New York foundry grades, and also foreign Irons, when the freights are added, are shut out from the Western trade; besides, the quality has no favor with consumers. On the opening of navigation in the spring, and low rates of freight by water and the very low prices of Scotch and English Pig at tide water, these Irons will doubtless be put into the further West markets in considerable quantity—enough, perhaps, to fill the gap and prevent any great advance in prices of Western and Southern makes. The coming monthly report of the Western Pig Iron Association is looked forward to with interest on the part of some furnacemen, as the late local statistics show an increase of production considerably above the consumption of the past two months. Looking over the whole field it is thought to be fair to predict that there will be no material change from the present condition of the Iron market in the near future. Quotations are f.o.b. here, or less freight to Cincinnati when orders are filled for direct shipments from foundry:

Charcoal Foundry.		
Hanging Rock, Best, No. 1, 4 mos.	$21.00 @	.....
Hanging Rock, Good, No. 1, 4 mos.	20.00 @	20.50
Southern No. 1, 4 mos	18.00 @	.....
Southern No. 2, 4 mos	17.00 @	17.50
Coke Foundry.		
Ohio and West Pennsylvania, No. 1, 4 mos	17.50 @	19.50
Ohio and West Pennsylvania, No. 2, 4 mos	17.00 @	18.50
Southern No. 1, 4 mos	18.00 @	18.50
Southern No. 2, 4 mos	17.00 @	17.50
Silver-Gray Softeners.		
Ohio, No. 1, 4 mos	18.00 @	19.00
Ohio, No. 2, 4mos	17.00 @	18.00
Ohio, No. 3, 4 mos	16.00 @	17.00
Other makes, Stonecoal, Charcoal and Coke	17.00 @	19.50
Car-Wheel.		
Hanging Rock Cold-Blast Charcoal	23.00 @	26.00
Hanging Rock Warm-Blast, 4 mos	19.00 @	20.50
Southern Warm-Blast, 4 mos	17.50 @	19.50
Southern Standard Warm-Blast, 4 mos	23.50 @	25.00
Georgia Cold-Blast, 4 mos	25.00 @	.....
Forge.		
Various makes and grades 4 mos	15.00 @	18.00
Scrap.		
Rails, cash	20.00 @	22.00
Wheels, cash	17.00 @	18.00
Wrought, ℔ 100 ℔	.60 @	.80
Wrought, light, ℔ 100 ℔	.30 @	.50
Cast, ℔ 100 ℔	.30 @	.70

50¢ ℔ ton from time quotations for cash.

St. Louis.

ROGERS, BROWN & CO., St. Louis, W. H. SHIELDS, manager, report, under date of February 22: Prices are firm, with an inclination to advance rather than decline. Inquiries for delivery within the next few months are quite numerous; nevertheless, the market is quiet and somewhat irregular, owing partly to the Coke strike. The machine shops report the outlook better than for some months past. The market, taken as a whole, is very satisfactory. We quote:

CHARCOAL FOUNDRY.		
Missouri	$17.00 @	$18.00
Southern	18.00 @	20.00
COAL AND COKE FOUNDRY.		
Southern, No. 1	18.75 @	19.00
Southern, No. 2	17.75 @	18.00
Southern, No. 2½	17.25 @	17.50
American Scotch	18.00 @	21.00
MILL IRON.		
Southern	15.75 @	16.75
CAR-WHEEL AND MALLEABLE IRONS.		
Southern	22.00 @	25.00
Lake Superior	22.00 @	24.00
SCRAP, ETC.		
Old Wheels	16.00 @	17.00
Old Rails	21.00 @	22.00
Connellsville Coke (East St. Louis)	.... @	5.30

Trade Report.

General Hardware.

There is a fair activity in trade, and a hopeful feeling prevails. Prices in several lines are stronger, and we give below the announcement of advances in some classes of leading goods. The advances in labor are an important feature in the present situation, and tend to give firmness to some lines in which higher quotations are not yet made.

NAILS.

The market is firmer, and while some buyers are holding off there are indications of the coming of the spring trade through the increased activity. In the West the compromise of the Junction Co., which we discuss editorially, points to the possibility of the termination of the strike at no distant date. So far as our local market is concerned, a general resumption there will have little effect, because sales Westward have not been heavy of late, and because the visible supply is light at the eve of the most active season of the year. The course of the market will depend very largely upon the magnitude of the demand and the temper of the buyers. We quote $2.40 for carload lots of Iron Nails on dock, and $2.45 to $2.50 from store.

The Danville Nail and Mfg. Co., of Danville, Pa., have issued in handy form a very valuable and convenient telegraphic code for the use of the trade.

BARB WIRE.

The market is quiet, but firm, some manufacturers, especially in the West, expressing indifference as to sales, expecting to realize better figures at an early date. We quote 4.75 cents for carload lots of Four-Point Barb Wire, Galvanized; 4⅞ cents for 3-ton lots and 5 cents for 1-ton lots. A meeting of Eastern manufacturers will be held early in March. To-morrow a meeting takes place in Chicago.

MISCELLANEOUS PRICES.

The following is the list of Hollow ware manufactured by the Pierce Hardware Co., Rocky Hill, Conn., the list being subject to a discount of 40 per cent.:

Round Bottom Kettles, with Legs.

Qts.		Plain.	Enameled.
4,	fits 6-inch stove	$0.80	$1.10
4½,	fits 7 and 6 inch stove	.90	1.25
6,	fits 8, 7 and 9 inch stove	1.10	1.50
9,	fits 9, 7 and 8 inch stove	1.30	1.75
12,	fits 9, 7 and 8 inch stove	1.50	2.00

Round Bottom Kettles, without Legs.

Qts.		Plain.	Enameled.
8,	fits 7, 8 and 9 inch stove	$1.20	$1.60
10,	fits 7, 8 and 9 inch stove	1.35	1.75
14,	fits 7, 8 and 9 inch stove	1.60	2.10

Round Bottom Kettles, without Legs and with Steam Outlet.

Qts.		Plain.	Enameled.
8,	fits 7, 8 and 9 inch stove	$1.40	$1.85
10,	fits 7, 8 and 9 inch stove	1.55	2.00
14,	fits 7, 8 and 9 inch stove	1.80	2.25

Flat Bottom Kettles.

Qts.		Plain.	Enameled.
3½,	fits 7 inch stove	$0.80	$1.10
4½,	fits 8 inch stove	.90	1.25
6½,	fits 9 inch stove	1.10	1.50
9,	fits 9 inch stove	1.30	1.75

Scotch Bowls.

Qts.	Plain.	Enameled.
2½	$0 75	$1.00
3½	.90	1.20
4½	1.00	1.35

The following are the prices of the Miter Boxes and Mole Traps manufactured by L. H. Olmsted, Corona, N. J.: Mole Traps, per dozen, $19.80, discount 33⅓ per cent.; Miter Boxes, per dozen, No. 1, $12, No. 2, $18, discount 25 per cent.

The trade throughout the country are appreciating the luxury of having a standard Screw list, and express themselves as finding especial pleasure in computing the value of the goods, unembarrassed by any distracting questions as to list and discount, their satisfaction being augmented by the fact that the new prices make a gratifying increase in the value of the goods on hand. This, we should judge, is regarded by them as sufficient compensation for the fact that their next order must be at advanced quotations.

Some regret is expressed that some of the jobbing houses who were parties to the agreement to maintain such advances as the manufacturers might make are ignoring the fact of the improved and higher prices of certain lines of goods, among which Steel Goods, Strap and T Hinges, Cast Butts, Carriage Bolts and Screws may be mentioned.

CANADIAN TRADE.

We have already alluded to the fact that some of our manufacturers report a falling off in the volume of Canadian business, several of them supposing that this was to be accounted for by the increased importation into Canada of English goods. Advices of which we are in receipt from leading Canadian Hardware houses do not, however, confirm this impression, and it is probable that any falling off there may be in the purchases of American Shelf Hardware is owing largely to the prevailing dullness of trade during the winter season, and the expectation is expressed that such diminished trade is only temporary, and that with a revival of business generally there will be a renewal of orders. It is, however, also evident that there has of late been a considerable development of manufacturing in Canada, and that the increase in home production is another reason for the falling off in the business with the States. But, as referring to the condition of Canadian trade in the aspects under consideration, we take pleasure in laying before our readers an extract from a letter received recently from a leading house:

In our opinion, and in our section and part, we think the shortage in the Canadian trade with the United States is to be accounted for by the fact that very many lines are now almost fully supplied by Canadian manufacturers, as Nails, Screws, Bolts, Horseshoes, Horse Nails, Rope, Sheathing and Building Paper, Brass and Bronze House and Ship Goods, Wood Goods, Machinery, and a lot of other goods which are now more in the line of the American than of the English, and they supply the place of American goods. The duty on the above averages more than 30 per cent. There are other lines, especially Belgian or German goods, which displace both American and English, such as Brass Wire Cloth, Iron and Steel Wire, Revolvers, Pistols, Guns, Zinc, Spelter, such small tools as Pincers, Compasses, Corkscrews, Scissors, &c., and Chain, Glass and Glass Wares. These goods, with prompt dispatch and low prices and freights, can now be laid down in seaboard towns in Canada at as low a freight, if not lower, than from average distances in the United States. Besides, the first cost of these goods is very low. Our customers prefer, and will even give more for, American Hardware. We still import from England, and do not note much falling off in such regular goods as Rodgers's and Wostenholme's Butchers' Cutlery, Butchers' Files, Firths' Steel, fine Scissors, Steel Goods, Guns, Tubing, Brass and Copper Sheets, Linseed Oil, Paints, Metals, &c. They keep changing from time to time, but on the average about the same amount is coming along. The Canadian or domestic manufactures are to a greater extent displacing articles which are American than English. We think again that people import English because the conditions of purchase are more liberal than the United States, other things being equal.

Another letter from a prominent house refers to the situation as follows:

If there is any falling off with the trade in Canada by your American manufacturers it cannot be attributed to the fact that the English makers are regaining to any extent the trade which they have in some measure lost in the Dominion. We are inclined to think if a falling off has occurred that it is more from a natural cause—that is, decreased consumption within the past year—although we are inclined to think that in consequence of our Canadian industries being well protected and greater vigilance being exercised by the customs authorities in the admission of American goods under combination prices existing in the United States an impetus has been given to home trade among the makers. There is no disguising the fact that the class of goods that are turned out by the American makers are preferred to the goods of the English manufacturer, and it really would not pay English makers now to cater to Canadian trade for the amount of certain goods of American pattern that we consume, as it would necessitate putting in improved machinery, and the volume of business for this market would not admit of it.

Another influential house, doing an extensive business, writes as follows:

The importation of both English and American Hardware is continually decreasing, mainly on account of the increased variety of articles made here, together with the improved facilities for manufacturing Hardware in Canada and our high tariff. We do not think that American Hardware manufacturers are losing ground faster in Canada than our English manufacturers. We continue to buy from England large quantities of Pocket Cutlery, Tin Plates, Iron, Chain, &c.

Another Canadian house, referring to the falling off of American trade in the Canadian market, express the opinion that the increased importation of English Hardware cannot be the cause, as they are not able to perceive any change in the volume of goods received from England. They add:

In fact, we are under the impression that if there has been any change it has been the other way, and that our trade with Great Britain has decreased, if anything, in the last few years. Possibly the dull times in Canada have had something to do with our importations from all quarters, and, moreover, the excessive duties which we are now obliged to pay have forced us to buy in our own market what formerly we imported.

ITEMS.

Announcement is made by John B. Morris, late of the Morris Sash Lock Mfg. Co., Cincinnati, that, having purchased the entire plant, including the tools, machinery and everything appertaining to the business of the late Miles Greenwood, he will continue the same business at the old stand, corner of Johnson and Canal streets. It is also announced that he has secured the services of B. Roux and W. H. Edwards, whose knowledge of the requirements of the trade are referred to.

George N. Pierce & Co., Buffalo, N. Y., whose New York City office is at 195 Water street, issue their catalogue for the coming season, which illustrates the line of Japanned and Brass Bird Cages, Refrigerators and Ice Chests of which they are manufacturers. In their circular to the trade, with which the pamphlet opens, they call attention to the fact that they are manufacturing with increased facilities over 165 styles of Bird Cages and 20 styles and 48 sizes of Refrigerators and Ice Chests. The list will be of interest to the trade as representing this varied line, with the most recent additions.

Announcement is made, February 3, by P. F. Burke, 360 Dorchester avenue, South Boston, Mass., that the copartnership existing under the firm name and title of C. F. Dewick & Co. has been dissolved by mutual consent. Mr. Burke, one of the partners of the late firm and the inventor of the Toe Calks manufactured by them, states that, having by purchase become sole proprietor, he will liquidate the affairs of the firm and continue the business uninterruptedly.

In a recent circular the Chieftain Hay Rake Co., Canton, Ohio, call attention especially to their Post Hole Diggers, illustrating their well-known styles of their manufacture.

The Salem Wire Nail Co., Salem, Ohio, are reported to be running double turn in both their Wire and Nail departments, and are said to be in the market energetically as manufacturers of Wire Nails.

We learn that Sidney Shepard & Co., Buffalo, N. Y., are making quite large additions to their extensive plant in that city, both in building and machinery. They are now putting in, we are advised, one of the largest and strongest drawing presses for deep stamping ever used in this country, in which all the latest improvements are embodied.

Townsend, Wilson & Hubbard, Philadelphia, have reorganized their business into a stock company for the manufacture of Norway and Charcoal Iron Carriage Bolts and Superior Clips, with a capital of $200,000, under the name of Townsend, Wilson & Hubbard Bolt Co.

H. M. Quackenbush, Herkimer, N. Y., issues an attractive catalogue displaying the specialties of his manufacture. His Air-Gun, with which the trade are familiar, is prominently represented, its construction explained, and the most recent patterns, together with those longer on the market, illustrated. His Safety Cartridge Rifle is alluded to as something entirely new, and the cheapest accurate Rifle yet offered. In addition to the Darts, Slugs and Shot and Targets connected with the Air Gun, the catalogue illustrates Nut Picks, Stair Carpet Rods, Desk Racks, Book Racks, Ornamental Wire Stove Rods, Pokers, &c, and H. M. Quackenbush's No. 1 Lathe.

Paine, Diehl & Co., 12 Bank street, Philadelphia, manufacturers of Bryant's Patent Egg Beaters, in response to inquiries from the trade for the address of jobbers handling this Egg Beater, issue a circular giving the names of many leading houses who regularly carry the goods in stock.

Several of the manufacturers of Skates are making arrangements for the manufacture of the Acme Pattern Skates, which will enable them to meet very, nearly, if not quite, the prices of the German goods. The effect of this enterprise will be the placing on the market of a fair Skate at a low price, and is expected to put a stop to the importation of the German goods.

The Ross & Fuller Association, 97 Chambers street, New York, have been appointed agents for the Patton Mfg. Co., Columbus, Ohio, manufacturers of Stove Hollow-ware, Enameled Maslin Kettles, Saucepans, Glue Pots, &c.; and also for the G. J. Dickson Mfg. Co., Albany, N. Y., manufacturers of Patent Spiral Spring Ice Tongs, Sidewalk Cleaners or Ice Chisels, Mincing Knives, &c.

The American Screw Co., Providence, R. I., are not able to state definitely the amount of their loss from the recent burning of their Chicago house. There were at that time about $50,000 worth of goods in the store, which were pretty well covered by insurance. The fire originated in the second floor, burned up to the roof and down to the basement, and a large portion of the goods were injured by fire or water, or both.

It may be added to the description given in last week's paper that the method adopted by Leggett & Bro., 301 Pearl street, New York, in putting up their Glue and Liquid Paints, was patented by them January 19, 1886.

The Keystone Screw Co., Philadelphia, for whom Sise, Gibson & Co. are agents, 100 Chambers street, New York, have, in common with the other manufacturers, adopted the new lists and discounts on Screws.

The trade will observe the announcement on page 18, in which Wiebusch & Hilger, 84 and 86 Chambers street, New York, call the attention of the trade to some of the lines of Hardware, Guns and Gun Material and Cutlery in which they are manufacturers and importers. It will be observed that many lines of leading goods are thus offered to the trade.

The Wiley & Russell Mfg. Co., Greenfield, Mass., manufacturers of the Lightning and Green River Machinery and Tools, have purchased the Tap Machinery invented by Mr. Goddard and formerly owned and operated by J. E. Redfield, at Essex, Conn. This machinery is a complete set of automatic lathes with suitable milling machines, and is described as capable of the most exact work in chasing the threads of Taps, giving a perfect regularity of form and size, with a symmetrical and uniform relief to the teeth. The acquisition of this machinery and patents gives the company increased facilities for the product of their Lightning Taps, and is referred to also as securing improvement in their quality.

G. & M. Nolin, Skowhegan, Me., are using a new and improved method of manufacturing Grass and Corn Hooks. It consists in crimping and pressing into shape Sheet Cast Steel, after which the goods are hardened in oil, the handles ferruled, driven on solidly and riveted, so that there is, they claim, no pulling off or turning. It will thus be seen that the goods are made of solid Steel, a point to which the manufacturers direct especial attention.

THE MENEELY HARDWARE CO.,

West Troy, N. Y., issue a new descriptive catalogue of their Safety Harness Snaps, Guard Snaps, Chain Link Snaps, and Rope and Chain Goods. This pamphlet represents their line of goods, with the most recent additions, and is accompanied by the following discount sheet, the terms of which are cash, 30 days, with an additional 2 per cent. for cash in 10 days from date of invoice:

Page.	Discount.
5, Safety Harness Snaps	60
5, Safety Open Eye Swivel Snaps	60
5, Safety Open Eye Snaps	60
6, Safety Breast Strap Snaps	60
6, Safety Round Eye Snaps	60
7, Guard Harness Snaps	60
7, Guard Round Eye Snaps	60
8, Link Snaps for Traces	60
8, Link Snaps, for Chains	60
11, Safety Cattle Ties, Jute	50
11, Safety Cattle Ties, Hemp	50
12, Safety Horse Ties, Jute	50
12, Safety Horse Ties, Hemp	50
12, Horn Ties, Jute	50
12, Horn Ties, Hemp	50
13, Rope Halters, Jute	50
13, Rope Halters, Hemp	50
14, Rope Web Halters, Jute	50
14, Rope Web Halters, Hemp	50
14, Halter Leads, Jute	50
14, Halter Leads, Hemp	50
15, Rope End Binders	50
16, Weight Cords	50
17, Rope Driving Reins, Cotton	50
17, Rope Driving Reins, Jute	50
18, Breast Chains with Sleeve Snaps	50
18, Sleeve Snaps	50
18, Tapered Breast Chains	50
20, Hitching Chains	50
20, Halter Chains	50
20, Rein Chains	50
15, Hitching Weights	25

THE PECK, STOW & WILCOX CO.,

New York and Southington, Conn., issue the following discount sheet, February 15, in which, it will be perceived, there is a general revision of their prices. No changes are, however, made in the prices of Tinners' Tools and Machines, which we accordingly omit, they remaining as published in our issue of January 14. The special goods marked A are subject to a cash discount of 2 per cent. beyond the prices given below, all other goods being subject to an additional cash discount of 10 per cent.:

Tinners' Hardware.

Page in 1885 catalogue.	Discount. Per cent.
95-103, Coffee Mills	A 45&10
104, Candle Sticks and Flue Stops	25
105, American Snuffers	no goods
105, Plumbers' Scrapers	25
105, Paste Jaggers	25
106, Coppers and Copper Handles	40
108, Plumbers' Ladles	25
107, Wire Gauges	16⅔
108, Fire Pots	33⅓
109, Malleable Kettle Ears	33⅓
110, Kettle and Tea-Kettle Ears	50&5
111, Malleable Ears and Clips	25
112, Milk Cans and Toilet Handles	25
113, Saucepan Handles	33⅓
113-115, Teapot Handles	30
116, Waffle Iron and Coffee Roasters	10
117, Toy Sad-Iron Stands	33⅓
118, Sad-Iron Stands	33⅓
119, Coffee-Pot Stands	30
120, Stove-Cover Lifters	30
121-123, Stove Pokers	50
124-125, Coal Tongs	33⅓
126, Coal Shovels	33⅓
127-133, Shovel, Tongs and Pokers	50&5
134-136, Shovel and Tongs Stands	50&5
137, Fire Sets	50&5
138-143, Fire and Kitchen Sets	50&10
144, 145, Blower Stands	50&10
146, 147, Iron Fire Dogs	50&10
148-156, Brass Andirons and Fenders	50&10
157, Umbrella Stands	60
158-169, Match Plates and Safes	40
170, Towel Rollers	50
170, Book Racks	40&10
170, Stove Bolts	50&10

General Hardware.

173, Mechanics' Wrenches	60
174, Machinists' Wrenches	60&10
174, Agricultural Wrenches	70
175, Shepard's Wrenches	75
175, Coe's Malleable Wrenches	75&5
175, Add Hayden's Pocket Wrenches, 4 inches:	
No. 1 Plain, per doz., $8.75	70
No. 2 Polished, per doz., $6.25	70
No. 3 Nickel-Plated, per doz., $10	70
175, Add Hayden's Pocket Wrenches, 6 inches:	
No. 4 Plain, per doz., $6.25	70
No. 5 Polished, per doz., $11.25	70
No. 6 Nickel Plated, per doz., $15	70
176-177, Steel and Iron Squares	50&10
178, Wing Dividers	50&10
178, Calipers and Compasses	50
179, Flat and Round Nosed Pliers	40
179, Carpenters' Pincers	40&10
179, Add 6 inch	per doz., $5.25
180, Socket Firmer Chisels, No. 1 Ex	70
180, Socket Firmer Chisels, No. 1	70&5
181, Socket Framing Chisels	70
181, Socket Corner Chisels	70
181, Carpenters' Slicks	70
182, Socket Framing Mill. Chisels	70
182, Socket Firmer Mill. Chisels	20
182, Socket Paring Chisels	20
183, Extra Tanged Firmer Chisels	40
183, Extra Tanged Firmer Gouges	40
183, Socket Firmer Gouges	20
184, Socket Firmer Millwright Gouges	20
184, Socket Firmer Paring Gouges	20
185-187, Drawing Knives	70
188-189, Handles	70&10
190-191, Hatchets and Boys' Axes	25
192, Bush Hooks	25
193, Butchers' Cleavers	20
193, Corn Hooks	20
194, Cast Hatchets	25
194-195, Steak Hammers	25
195, Nail Hammers	33⅓
196-197, Tack Hammers	33⅓
198, Nantucket Drivers	25
198, Carpet Stretchers and Tack Claws	33⅓
199, Shoe Hammers	33⅓
200, Peck's Patent Braces	40&10
201, Bit Braces	50
202, Saw Rods	33⅓
203-204, Saw Sets	33⅓
204, Cheese and Butter Triers	25
205, Screw-drivers	60
206, Box Scrapers and Chisels	40
206, Cold Chisels	60&10
207, Box and Cotton Hooks	50
208-209, Vises	33⅓
210, Geared Breast Drills	40&10
210, No 4 Nickel-Plated Drill	25
211, Ratchet and Blacksmith Drills	16⅔
212, Blacksmiths' Shoeing Pincers	33⅓
212, Blacksmiths' Butterises	33⅓
212, No. 13, Farrier's Hammers	33⅓
213, Steel Traps	50&5
214, Wagon Jacks and Jack Screws	30
215, Bench Screws and Door Clamps	20
216-217, Quilt Frame and Cabinet Clamps	33⅓
217, Carriage-makers' Clamps	25
218, Ice Picks and Ice Axe and Picks	33⅓
219, Scratch Awls	33⅓
220-221, Steelyards	25
221, Scale Beams	40
222, Spring Balances	30
223, Tea and Counter Scales	30
224, Dixon's Meat Cutters	20
225, Hale's Meat Cutters	50
226-227, Meat Cutters and Stuffers	20
228, Cherry Seeders	33⅓
229, Apple Parers	no goods
230, Tobacco Cutters	33⅓
232, Door Bells, change list:	

Nos.	905	910	915
	$8.50	10.00	12.00

235, Add No. 07 Bell Lever, per doz., $2.15	
240, Change list, No. 0560 to $1.65	
231-251, Door Bells and Levers	20
252, Trip Gong Bells	20
253, Alarm Door Bells	20
254-255, House Bells on Carriages	20
256, Slide Bell Pulls	20
256-257, Bell Cranks	20
258, Bell Cranks, Spikes and Springs	20
259, Hand Bells	20
260-266, Call Bells	25
267-271, Flush Bolts	30&10
272-273, Mortise Front Door Bolts	40
274-276, Chain Door Fasteners	30
277-280, Chain Door Bolts	35
281, Bottom Bolts	35
282-283, Spring Foot Bolts	35
284-286, Square Spring and Square Cased Bolts	40
287, Nos. 415 and 417, Wrought Spring Bolts	66⅔
287, No. 503, Cast Spring Bolts	50
288-289, Wrought Iron Square Bolts	55
290, Cast Brass Square Spring Bolts	40
291, Cast Brass Square Neck Bolts	40
291, No. 425, Wrought Square-necked Bolts	66⅔
291, No. 504, Cast Square-necked Bolts	50
292-293, Barrel Bolts	33⅓
294, Nos. 500, 506, Cast Barrel Bolts	40&10
294-295, Wrought Barrel Bolts	40&10
296-297, Cast Brass Barrel Bolts	40
298, Iron Knob Tower Bolts	40&10
298, No. 502, Flat Shutter Bolts	40&10
298, No. 505, Lever Bolts	40
299, Japanned Staples	50
299, Flat Ship Bolts	75
299, Straight Cupboard Bolts	45
300-302, Flat Cupboard Bolts	50
303, Brass Show-Case Catches	40
303, Flush Cupboard Catches	40
304-305, Brass Flush Cupboard Catches	20
306-307, Cupboard Latches	33⅓
308-318, Cupboard Catches	33⅓
319-323, French Window Catches	33⅓
324-327, Cupboard Turns	33⅓
328-329, Screen-Door Catches	40
330-332, Door Buttons	37½
333-349, Sash Fasts	33⅓
350-353, Sash Locks and Window Casters	33⅓
354-357, Shutter Bars	40
358-360, Sash Lifts	33⅓
361, Shutter Lifts	40
362, Sash Lifts and Locks	40
362, Shutter Knobs	33⅓
363, Stubs and Plates	25
363, Shutter Screws	35
364, Window Spring Bolts, Change list	40

Nos.	110	115	120	137
Per gross	$1.75	1.75	2.25	3.75

364, Window Spring Bolts and Sockets	40
364, Window Springs	33⅓
364, Add Window Springs to screw:	
No. 27, Brass Bolt, per gross	$7.00
No. 29, Iron Bolt, per gross	5.00
365-366, Sash Cord Irons, Centers and Props	33⅓
366-367, Trunk and Sash Rollers	35
368-372, Axle and Frame Pulleys	33⅓
373, Hay Fork Pulleys	35
374-375, Screw and Side Pulleys	35
376, Upright and Yard Line Pulleys	35
Add Yard Line Pulleys:	
376, No. 225, Japanned,	
Inches	2½ 3
Per doz	$0.85 1.10
376, No. 230, Galvanized,	
Inches	2½ 3
Per doz	$1.40 1.75
377, Clothes-Line Pulleys	33⅓
378-379, Hot-House and Awning Pulleys	33⅓
380, Sliding Shutter Sheaves	30
380, Encased Swivel Pulleys	30
381, Well Wheels and Hooks	30
382-397, Drawer Pulls	30
398-399, Card Frames	40&5
400, Cast Brass Flush Rings	50
400, Pendant Drawer Pulls	40
401, Drawer and Lifting Handles	50&10
402, Cast Brass Lifting Handles	50&10
403, Japanned Lifting Handles	40&10
403-408, Chest Handles	50&10
409, French Window Shutter Handles	40&10
409, Trap Doop Rings	50&10
410, Door Knobs	50
411, Escutcheons	50
412-413, Letter-Box Plates	40&10
414-435, Store Door Handles	30
436, Barn Door Bolts	30
436-437, Barn Door Latches	25
438, Add Cottage Latch, No. 29, per doz.	$1
438-441, Thumb Latches	25
442-446, Door Pulls	33⅓
447-469, Hat and Coat Hooks	40&5
469, Add Hat and Coat Hooks with Wrought Screw—No. 33 Japanned, per gross	$3.60
No. 133 Coppered, per gross	3.60
470-474, Wardrobe Hooks	40&5
475-477, School-house Hooks	40&5
477-479, Clothes-line Hooks	40&10
480-481, Harness Hooks	40&10
482-487, Chandelier and Ceiling Hooks	50
488, Lamp and Cabin-door Hooks	50
489, Drive and Screw Hooks	50
490, Molding and Mirror Hooks	50
490, Cup Hooks	50
491, Hammock Hooks	40&10
492-499, Bird-cage Hooks	40&10
500-507, Casters	40&5
508, Bed Keys	40&10
509, Bedstead Fastenings	40&10
510, Ox Bow Pins	50
511, Cattle Leaders and Bull Rings	40&10
512, Ox Balls	40&10
513, Plumb Bobs	50
514, Hitching Rings	50
514, Hog Scrapers	45
515, Pruning Shears	50
516, Nut Crackers	50
517, Garden Forks and Trowels	40&10
518, Boot Jacks	40
519, Foot Scrapers	50
519-521, Kitchen Grindstones	20
522, Grindstone Fixtures	40&10
523-525, Strap and T Hinges	A 65&5
525, Hinge Hasps	A 65&5
526-527, Hook and Plate Hinges	40
528-530, Wrought Butts and Hinges	A 65
531-533, Spring Hinges	50
534, Loose Pin Butts	55
534, Loose Pin Butts, No. 10	60
535, Loose Pin Butts	60
536, Blind Hinges	65
537-543, Hinges and Gate Latches	55
544-547, Barn-Door Hangers	40&10
545, Barn-Door Stays	40&5
546, Barn-Door Rollers	40&10
546, Sliding-Door Sheaves	55
547, Barn and Sliding-Door Rail	40
548-549, Pitcher Pumps	50
550-553, Steel Hammers	10
554, Saddlers' Punches	50
554, Tack and Nail Puller	50
554, Agricultural Screw Driver	50
555-572, Flower Pot and Lamp Bracket	30&10
572-580, Shelf Brackets	30&10
581, Flower Basket	40
582-584, Twine Boxes	40&5
585, Erasers	40&5
585, Card Racks	40&5
586-593, Ink Stands	40&5
594-599, Paper Flies	40&5
600-601, Paper Clips	40
603-604, Paper Weights	40&5

Carriage and Saddlery Hardware.

607, Common Carriage Bolts	A 75&10
608, Phil. Pat. Carriage and Tire Bolts	A 75&10
609, Eagle Carriage and Tire Bolts	A 75&5
610, Machine Bolts	A 75
610, Bolt Ends	A 75
611, Coach Screws	A 75&5
611, Gimlet-pointed Coach Screws	A 75
612, Sleigh Shoe Bolts	70
612, Plow Bolts	40&5
612, Felloe Plates	33⅓
613, Iron Washers ⅝ and less	A 90¢ off list
Iron Washers, 7-16 and larger	A 85¢ off list
614, Square Nuts ⅝ and less	A 90¢ off list
Square Nuts 7-16 and larger	A 85¢ off list
615, Hexagon Nuts	A 10¢ off list
617, Tubular Lantern Holder	50
618, Carriage Bands	50&5
619, Carriage Knobs	30
620-624, Shaft, Hame and Whiffletree Tips	50
624-627, Neck Yoke Tips and Pole Tips	50
628-629, Club Handles	50
630, Whip Sockets	33⅓
630, Inside Coach Handles	50
631, Spring Bar Bolts	50
632, Harness and Breeching Dees	33⅓
633-634, Cockeyes and Pad Trees	40
635, Terrets, Hooks and Swivels	40
636, Axle and Spring Bar Clips	60
647-651, Curry Combs	30

SARGENT & CO.,

New Haven and New York, have issued the following discount sheet, No. 4, bearing date February 15, giving the revised discounts on the goods of their manufacture. It will be perceived that it embodies the recent advances to which we have referred, and that the discounts generally are revised. It is the also stated that wherever the English Bronzed goods appear in their catalogue the

Tokio will be substituted, using the same numbers and list prices, and it is explained that the Tokio Bronzed goods have the raised surfaces plated with Light Colored Bronze Metal, nicely polished, the background being finished in black. It is also intimated that they will issue a complete discount sheet, No. 5, before long, covering all the goods in their catalogue, also some new pages and an illustrated price list of Door Locks, Knobs, &c. In addition to the prices named below there is the usual extra discount of 10 per cent. for prompt cash :

Page in 1884 Catalogue.		Discount, Per cent.
2.	No. 30, Fast Joint Butts	55
3.	No. 50, Loose Joint Butts	66⅔
4.	No. 152, Loose Joint Butts, add new sizes, 3½ x 4, $2.55; 4 x 4½, $3.20	60
4.	No. 153, Butts, new list, as follows	66⅔

2 x 2	2½ x 2	2½ x 2½	3 x 2½	3 x 3
$2.00	2.30	2.50	2.80	3.00
3 x 3½	3½ x 3	3½ x 3½	4 x 3½	4 x 4
$3.25	3.45	3.70	4.25	4.50
4½ x 4½	5 x 5	5½ x 5½	3½ x 4	4 x 4½
$5.50	7.00	8.50	4.00	5.00

4.	No. 156, Loose Joint Butts			66⅔
5.	No 158, Butts, new list, as follows			66⅔

2 x 2	2½ x 2	2½ x 2½	3 x 2½	3 x 3
$2.80	3 10	3.30	3.60	3.80
3 x 3½	3½ x 3	3½ x 3½	3½ x 4	4 x 3½
$4.05	4.25	4.50	4.80	5.05
4 x 4	4 x 4½	4 x 5	4½ x 4	4½ x 4½
$5.30	5.80	6.20	6.10	6.30
5 x 5	5 x 5½	5 x 6	5½ x 5½	
$7.80	8.30	8.80	9.30	

5.	No. 159, Loose Joint Butts				66⅔
6.	No. 458, Boston Finish Butts				75&10
8.	No. 472, Berlin Bronzed Butts				75&10
9.	No. 476, Berlin Bronzed Butts				75&10
10.	No. 473, Berlin Bronzed Butts				70&10
11.	No. 896, 899, Bronze Butts				66⅔
12.	No. 875, Bronze Butts				66⅔
13.	No. 895, 898				66⅔
14.	No. 593, Polished Brass Butts				66⅔
	No. 893, Bronze Metal Butts				66⅔
15.	No. 894, Bronze Metal Butts				66⅔
	Add new size of Butts on pages 14, 15				66⅔

Nos.	593	893	894
New size, 2½ x 2½ in.	$3.50	4.00	4.25

16.	No. 1593, Polished Brass Butts			66⅔
	No. 1893, Bronze Metal Butts			66⅔
	Add new Polished Butts, see page 16A			
16A.	Brass and Bronze Metal Butts			66⅔
	Add new size of Butts on page 16A			

Nos.	1591	1891	1892
New size, 2½ x 2½ in.	$3.30	3.50	3 75
New size, 6 x 6 in	9.50	10.00	10.25

17.	No. 1894, Bronze Metal Butts			66⅔
	Add new size of Butts on pages 16, 17			66⅔

Nos	1593	1893	1894
New size, 2½ x 2½ in.	$3.50	4.00	4.25

18.	No. 886, Bronze Cap Butts		75
19.	No. 702, Nickel Cap Butts		70
20.	No. 42, Loose Pin Butts		66⅔
20.	No. 43, Butts, new list, as follows		66⅔

2 x 2	2 x 2½	2½ x 2	2½ x 2½	2½ x 3
$2.00	2.15	2.30	2.50	2.65
3 x 2½	3 x 3	3 x 3½	3½ x 3	3½ x 3½
$2.80	3.00	3.25	3.45	3.70
3½ x 4	4 x 3½	4 x 4	4 x 4½	4 x 5
$4.00	4.25	4.50	5.00	5.40
4½ x 4	4½ x 4½	4½ x 5	5 x 5	5½ x 5½
$5.30	5.50	6.20	7.00	8.50

20.	No. 46, Loose Pin Butts			66⅔
21.	No 142, Loose Pin Butts			66⅔
	No. 143, Butts, new list, as follows			66⅔

2 x 2	2 x 2½	2½ x 2	2½ x 2½	2½ x 3
$2.00	2.15	2.30	2.50	2 65
3 x 2½	3 x 3	3 x 3½	3½ x 3	3½ x 3½
$2.80	3.00	3.25	3.45	3.70
3½ x 4	4 x 3½	4 x 4	4 x 4½	4 x 5
$4.00	4.25	4.50	5.00	5.40
4½ x 4	4½ x 4½	4½ x 5	5 x 5	5 x 6
$5.30	5.50	6.20	7.00	8.00
5½ x 5½	6 x 6			
$8.50	10.50			

21.	No. 146, Loose Pin Butts			66⅔
22.	No. 32, Loose Pin Butts			60
	No. 137, Loose Pin Butts			70&10
22A.	No. 136, Boston Finish Butts			75&10
23.	Loose Pin Butts, No. 235			75&10
	Loose Pin Butts, No. 435			75&10
24.	Loose Pin Butts, No. 236			75&10
	Loose Pin Butts, No. 436			75&10
	Loose Pin Butts, No. 336			75
	Loose Pin Butts, No. 437			70
New 24A.	No. 333, Bronze Plated Butts			75
25.	Loose Pin Butts, Nos. 836, 839			70
26.	Loose Pin Butts, No. 834			70
27.	Loose Pin Butts, Nos. 845, 848			60&10
28.	Loose Pin Butts, Nos. 543, 843, 844			66⅔
28B.	Loose Pin Butts			60⅔
29.	Loose Pin Butts, Nos. 1543, 1843, 1844			66⅔
30.	Mayer's Hinges			66⅔
30.	Parliament Butts, Nos. 290, 295, 296			66⅔
31.	Parliament Butts, Nos. 590, 790			60
	Parliament Butts, No. 1495			65
	Parliament Butts, No. 1895, Tokio			65
	Parliament Butts, Nos. 1895, 1898			65
	Parliament Butts, Nos. 2895, 2898			65
32.	Parliament Butts, Nos. 2893, 2894			65
32.	Inside Shutter Hinges, Nos. 813 to 824			65
33.	Inside Shutter Hinges, Nos. 410 to 818			65
34.	Inside Shutter Hinges, Nos. 420, 425, 820, 825, 828			65
	Inside Shutter Hinges, No. 325, Tokio Bronzed			65
35.	Inside Shutter Hinges, Nos. 460, 860, 463, 863			65
35.	Add new sizes of Shutter Hinges			65

Nos	460	463	860	863
2½ x 3 inches	$8.50	11.00	28.00	30.00

55.	Pin Hinges		55
36.	L. P. Surface Butts		66⅔
	Refrigerator Hinges, Nos. 400 and 800		50
36B.	Model Spring Hinges		60
37.	Spring Hinges, Nos. 150, 250		60
	Spring Hinges, Nos. 1150 to 2350		60&10
38-39.	Surface Spring Hinges		55
40-41.	Mortise Spring Hinges		55
45.	Royal Spring Hinges:		
	Nos. 101 and 1101 (Japanned)		60
	All others (Bronze Metal)		50
46.	Victor Door Springs		50&10
	Champion Door Springs		50
46A.	Eclipse Door Springs		50
46B.	C. Eclipse Door Checks		50
47.	Torrey Door Springs		70&10
	S Door Springs		70&10
	Rubber Door Springs		55
48.	Strap and T Hinges		60&7½
	Add new sizes of Heavy T Hinges:		
	4-inch list		$1.50
	5-inch list		1.60
49.	Crate Hinges and Hinge Hasps		60&7½
	Crate Hasps, Nos. 1 and 2		60&7½
	Crate Hasps, No. 12		60&7½
50.	Galvanized Strap and T Hinges		60&7½
51.	Trap Door Hinges, No. 20		60
51.	No. 160, Fast Joint Plate Hinges		net
	6, 8, 10 and 12 inch, per 100 pounds		$5.75
	14-inch and larger, per 100 pounds		4.75
51.	No. 162, Loose Joint Plate Hinges		net
	6, 8, 10 and 12 inch, per 100 pounds		$5.75
	14-inch and larger, per 100 pounds		4.75
52.	No. 168, Hook Hinges		net
	8, 10 and 12 inch, per 100 pounds		$6.75
	14-inch and larger, per 100 pounds		5.50
52.	No. 79, Welded Hook Hinges		60
53.	No. 78, Welded Hook Hinges		60
53.	No. 98, Hook Hinges		net
	8, 10 and 12 inch per 100 pounds		$5 75
	14-inch and larger, per 100 pounds		4.75
53.	No. 88, Hook and Eye Hinges		60
54.	Rolled Plate and Raised Hinges		70
55.	Rolled Blind Hinges, Nos. 32, 34		50
	Rolled Blind Hinges, Nos. 232, 234		55
	Rolled Center Blind Hinges, Nos. 33, 35		50
	Rolled Center Blind Hinges, Nos. 233, 235		55
56.	Blind Hinges		75
57.	Blind Hinges, No. 12		75&10
57.	Wrought Turn Buckles		60
58.	Mackrell's Blind Fasts		55
58.	Drops and Pins		70
58A.	Double Acting Blind Fasts		55
59-65.	Gate Hinges		55
66-69.	Gate Hinges		60
69.	Gate Sockets		60
70.	Gate Latches		60
71.	Gate Latches, No. 8		60
71.	Upright Gate Latches		55
72.	Gate Latches, Nos. 0, 15		45
72.	No. 65, Wrought Gate Latches		40
73.	Barn Door Rollers		60&10
73.	Barn Door Hangers		60&10
74.	Wood Track Barn Door Hangers		60
74.	N. E. Barn Door Hangers		60&10
75.	Sterling Barn Door Hangers		65
75.	Barn Door Stays		55
76.	Barn Door Rail, Nos. 2 to 14		60
76.	Barn Door Rail, Nos. 24 to 47		60
	Barn Door Bottom Rail		60
	Sliding Door Rail		55
76A.	Wrought Sliding Door Rail		60
77.	Tower Bolts		60
77.	Barrel Bolts, change 8 in., No. 363, to 7 in		60
78, 79.	Wrought Barrel Bolts		60&10
80.	Light Barrel Bolts, excepting 360½ and 361½, Tokio Bronzed		60
80.	Light Barrel Bolts, 360½ and 361½		60
81.	Barrel Bolts, Nos. 272½, 472, 462		60
81.	Barrel Bolts, No. 862		55
82, 83.	Brass Barrel Bolts		66⅔
84, 85.	Elm City Barrel Bolts		60
86.	No. 320, Neck Bolts		60
86.	No. 423, Neck Bolts		60
86.	No. 522, Neck Bolts		60
87.	Nos. 325, 525, Neck Bolts		66⅔
87.	No. 316, Wrought Spring Bolts		66⅔
88, 89.	Wrought Spring Bolts		66⅔
90, 91.	Wrought Square Bolts		55
92.	No. 300, Square Bolts		60
92.	Floor Plates and Staples		60
92.	Cast Brass Square Bolts		60
93.	Square Bolts		65
94.	Square Cased Bolts		65
95.	Square Cased Bolts		65
96.	No. 801, Square Cased Bolts		60
	Nos. 505 and 703, Square Cased Bolts		60
97.	Square Cased Bolts		60
98.	No. 332, Shutter Bolts		60
98.	Nos. 337, 338, Shutter Bolts, add new si e No. 337, 4-inch, per doz., $2.50		60&10
99.	Shutter Bolts		60
100.	Foot Bolts		65
101.	Bottom Bolts		65
102, 103.	Foot Bolts		65
104, 105.	Chain Bolts		65
106, 107.	Chain Bolts		65
108, 109.	Chain Bolts		65
110, 111.	Chain Bolts		60
112, 113.	Mortise Door Bolts		60
114.	Mortise Door Bolts		60
114.	Ship Flush Bolts		60
115.	Brass and Plated Flush Bolts		60
116.	No. 65, Brass Flush Bolts		60
116.	No. 80, Brass Flush Bolts (Change list of 48 in. to $1 ; 60 in. to $1.20)		60
116.	No. 83, Nickel-Plated Flush Bolts		60
117.	No. 85, Brass Flush Bolts (Change list of 48 in. to $1; 60 in. to $1.20)		60
117.	No. 105, Brass Flush Bolts (Change list of 48 in. to $1.15; 60 in. to $1.40)		60
118-121.	Wrought Flush Bolts		55
	Add New Flush Bolts No. 154, same as No. 152, on page 119, with Plate 1½ in. wide. Advance 25 cents on the price of No. 152 for list		55
122.	Make list of No. 86 Bolts as follows		55

6	8	10	12	15	18	24
$2.75	3.05	3.45	3.95	4.50	5.30	6.80

122.	Make list of No. 88 Bolts as follows						55
6	8	10	12	15	18	24	
$3.15	3.50	3.85	4.25	5.15	6.00	7.65	
122, 123.	Flush Bolts, Nos. 87 and 98						55
124.	No. 94, Bronzed Flush Bolts (Change the first size of No. 94 to 6 inch instead of 9 inch)						55
	No. 97, Bronzed Flush Bolts						60
124¼.	The projection of Flush Bolts, Nos. 94 and 98 should be 1¼ in. instead of 1⅝						
124½-127.	B. M. and Imperial Flush Bolts						60
128, 129.	Bronze Metal Flush Bolts						65
130, 131.	Mortise Flush Bolts						65
132.	Extension Flush Bolts						65
133.	Cupboard Bolts						60
134.	Cupboard Bolts (Change list No. 211 to $1.50)						60
135.	Cupboard Bolts						60
135.	Brass Flat Bolts						60
136.	Door Buttons						50
137.	Door Buttons						60
138.	Cupboard Latches						60&10
139.	Cupboard Catches, Nos. 3230-3432						60
139.	Cupboard or Locker Catches						60&10
140.	Elbow Catches						60
140.	Barn Door Elbow Catches						60
141.	Lever Cupboard Catches						55
142, 143.	Brass and Plated Cupboard Catches						60
144.	Show Case Catches						60
145.	Flush Ring Show Case Catches						60
145.	Show Case Catches, Nos. 21, 23						60
146, 147.	Rural Cupboard Catches						60&10
148.	Rural Cupboard Catches						60&10
149.	Japanned Cupboard Catches						60&10
150-152.	Cupboard Catches						60&10
153.	Cupboard Catches						60&10
154, 155.	Cupboard Catches						60
156, 157.	Cupboard Catches						60
158-160.	French Window Catches						60
161.	Transom Catches, Add Reverse Bevel						50
	No. 3245, same as 3243 Reverse						$20.00
	No. 3445, same as 3443 Reverse						22.00
162, 163.	Cupboard Turns						60
164.	Cupboard Turns, Change list of No. 4230 to $3, discounts as follows :						
	Cupboard Turns, 4230-4830						60&10
	Cupboard Turns, 4432-4832						60&10
165.	Cupboard Turns, 4240-4840						60&10
	Cupboard Turns, 4442-4842						60&10
166.	Cupboard Turns, 4450-4952						60&10
167.	Door Catches						70
167.	Closet						70
168.	Screen Door Catches, Nos. 200, 400						60
168, 168A.	Screen Door Catches, Nos. 8201, 8401, 8801, 8100						60&10
168¾-172.	Screen Door Catches						60&10
173.	Chain Door Fasts						60&10
174-177.	Chain Door Fasts						60&10
178-182¼.	Letter Box Plates						60&10
187-189.	Door Bells						60
190-195.	Levers for Door Bells						60
196.	Bell Pulls						50
197.	Slide Bell Pulls						55
198.	House Bells on Carriages						45
199.	Alarm Door Bells						60&10
199.	Door Knockers						66⅔
199.	Check Springs						65
200, 201.	Bell Cranks						50
202.	Mortise Bell Cranks						55
203.	Pulley Bell Cranks						60
204.	Roggin's Latches, No. 62						65
	Roggin's Latches, Nos. 30, 130						65
	Roggin's Latches, Nos. 32, 132						60
205.	Bronzed Door Handles, Nos. 21 to 23						65
205.	Bronzed Door Handles, Nos. 65, 67						60&5
206.	Japanned Door Handles						60
207.	Barn Door Latches						60
207.	Barn Door Hasp and Latch						60
208.	Japanned Store Door Handles						60
209-211.	Bronzed Store Door Handles						60&10
212.	No. 47, Store Door Handles						60&10
	No. 48, Store Door Handles, Change list to $4.50						60&10
213.	Bronzed Store Door Handles						60&10
214.	Store Door Handles, Nos. 20 and 19						60&10
	Store Door Handles, No. 40						60&10
214½.	Store Door Handles, No. 1115, &c						60
214⅞.	Store Door Handles, Nos. 38 and 37						60&10
	Store Door Handles, No. 33						60&10
215.	Bronzed Store Door Handles						60
216.	Brass, Plated and Bronze Store Door Handles						55
217.	Brass, Plated and Bronze Store Door Handles						50
218-219.	Brass, Plated and Bronze Store Door Handles						60
220-223.	Bronze Metal Store Door Handles						55
224-233.	Store Door Handles and Lock						60
234.	Flush Barn Door Pulls						66⅔
	Japanned Door Pulls, Nos. 502, 503, 504						60
235-241.	Door Pulls						60
242-245.	Push Plates						60
246-251.	Drawer Pulls						66⅔
252.	Drawer Pulls						70
253.	Drawer Pulls						70
254-257.	Drawer Pulls						70
258.	Drawer Pulls, excepting Tokio Bronzed						70
	Drawer Pulls, 1903, 1803, 1703, 1603						70
259.	Drawer Pulls, excepting Tokio Bronzed						70
	Drawer Pulls, 593, 493, 393, 293						70
260, 260¼.	Drawer Pulls						70
261.	Drawer Pulls						66⅔
262, 263.	Drawer Pulls						60&10
264, 265.	Drop Handles and Escutcheons						60&10
266.	Drop Handles						66⅔
266.	Japanned Lifting Handles						60&10
267.	Brass Lifting Handles						60
268, 269.	Lifting Handles						60
270.	Brass Ring Handles						65
270.	No. 25, Shelf Box Handles						65
271.	Brass Drawer and Trunk Handles						60
272.	Flush Rings						65
272.	Brass Flush Drawer Handles						55
273.	Flush Chest Handles						66⅔
273.	Flush Trap Door Rings						66⅔
274.	Flush Chest Handles						70
275.	Chest Handles, change list of No. 10 to $1.75						66⅔
276.	Tub Handles, Nos. 15 and 115						60
276.	Wrought Tub Handles						60&10
277.	Wrought Chest Handles, Nos. 71 to 176						60&10
	Wrought Chest Handles, Nos. 1 to 106						60
278, 279.	Clothes Line Hooks						66⅔
280.	Clothes Line Hooks, Nos. 41 and 51						66⅔
280.	Hat Rack Hooks						60
281.	Store Rack Hooks						60&10
281.	Harness or Baggage Hooks						60&10
282, 283.	Harness Hooks						60&10
284.	Hotel Hooks						60
285.	Hotel Hooks						66⅔
286, 287.	Coat and Hat Hooks to screw						60
287.	Coat and Hat Hooks, to drive						60&10
288-291.	Coat and Hat Hooks						60
292-299.	Coat and Hat Hooks, list of 1886 is $14						60
300, 301.	Coat and Hat Hooks						60
302.	Coat and Hat Hooks						60
302A.	Coat and Hat Hooks, Change list of No. 800 to $77.50						60
303.	Coat and Hat Hooks						60
304.	Coat and Hat Hooks						60
305-315.	Coat and Hat Hooks						60
316-318.	Wardrobe Hooks						60
319.	Japanned Screw Hat Hooks						60
319.	Brass Hat Hooks						60
320.	Ceiling Hooks						60
321.	Ceiling Hooks						55
321.	Chandelier Hooks, Nos. 260, 460, 860						55
322-324.	Chandelier Hooks						55
325.	Chandelier Hooks						55
325.	Lamp Hooks						55
326.	Screw Hooks, No. 412, Change list of ½ in. to $2.70						70
326.	Screw Hooks, Nos. 415, 419						70
327.	Wire Drive Hooks						50
327.	Brass Drive Hooks, No. 405						70
328.	Brush or Duster Hooks						70
328.	Coppered Screw Hooks						70
328.	Picture or Mirror Hooks						70
329.	Cup Hooks, Nos. 80 81						70
329.	Add new sizes, Brass Cup Hooks, No. 81, ½ in., $3.75; ⅝ in., $3.85						70
329.	Cup Hooks, Nos. 82, 80, 90						70&10
330.	Iron Hooks and Eyes, Nos. 50, 55						66⅔
	Brass Hooks and Pins, No. 63						60
331.	Brass Hooks and Eyes						60
332.	Cabin Door Hooks						60
333.	No. 100, Safety Gate Hooks						50&10
333-334.	Gate Hooks and Cornice Hooks						70&5
335.	Stair Rod Eyes						80
	Bird Cage Eyes						80
336-344.	Bright Wire Goods						70&5
345.	Wire Cup Hooks						70&5
346.	Belt Hooks						75
347.	Wire S Hooks						55
348.	Roller Ends, Change list of No. 1 to $3.60						55
348.	Shade Brackets, Change list of No. 2-0 to $2.10						55
349.	Molding Hooks						50
349.	Porcelain Center Curtain Pins						50
350.	Brass Head Picture Nails, Nos. 5, 4						50&10
	Porcelain Head Picture Nails, Nos. 50 and 60						50&10
351.	Porcelain Head Picture Nails, Nos. 10 and 11						50&10
351.	Porcelain Picture Knobs						66⅔
352.	Porcelain Drawer Knobs, Nos. 5 and 7						55
352.	Porcelain Stove Knobs, No. 8						55
353, 354.	Porcelain Shutter Knobs						65
355.	Shutter Knobs, change list of						55

Nos.	141	142	151	152	153
	$5.00	5.50	6.00	6.40	8.00

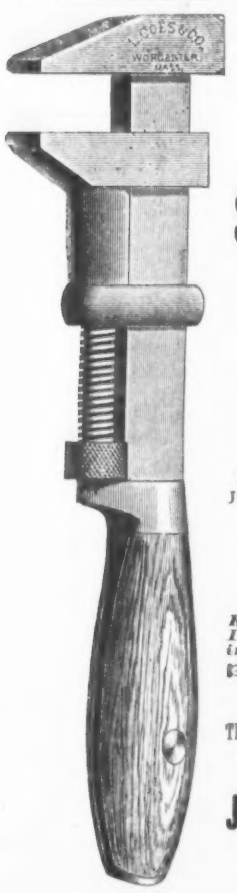
356-358.	Shutter Knobs		55
359.	Sash Knobs		60&10
359.	Brass Kettle Knobs		60&10
	Japanned Kettle Knobs		60
360, 361.	Sash Lifts		60
362.	Sash Lifts		60
362A.	Window Screen Sash Lifts		60
363.	Sash Lifts		60
364.	Sash Lifts		60
365.	Sash Lift and Lock		60
366.	Flush Sash Lifts		60
367.	Flush Sash Lifts		60
368.	Flush Sash Lifts		60
368B.	Flush Sash Lifts		60
369.	Flush Sash Lifts		60
370.	Flush Sash Lifts		60
371.	Window Pulls		60
372, 373.	Sash Pull Plates		60
374.	Sash Pulls		65
374A.	Sash Pulls		65
	Bedford Patent Window Attachment		65
374B.	Perry Patent Sash Pulls and Plates		65
375, 376.	Shutter Bars		65
377.	Shutter Bars, excepting No. 133		65
	Shutter Bars, No. 133, Tokio Bronzed		65
378.	Shutter Bars, excepting No. 163		65
	Shutter Bars, No. 163, Tokio Bronzed		65
379-385.	Shutter Bars		65
386.	Window Spring Bolts, add New:		
	No. 58, like 57 but for wider sash		$7.00
	No. 38, like 37 but for wider sash		7.50
386.	Window Spring Bolts, Nos. 10 to 22 inclusive		66⅔
	Window Spring Bolts, Nos. 37, 38, 47, 57, 58		66⅔
386.	Window Spring Bolt Sockets		60&10
387.	Window Springs, Nos. 0 to 7		60&10
	Window Springs, Nos. 17, 19		60&10
388.	Brass Window Bolts		70
388.	Sash Fasts and Props		45
389.	Sash Fasteners		60
390-398.	Sash Fasteners		66⅔
399.	Sash Fasteners		60&10
400.	Sash Fasteners, excepting No. 3572		66⅔
	Sash Fasteners, No. 3572, Tokio		60&10
401.	Sash Fasteners		66⅔
402.	Sash Fasteners, excepting No. 3672		66⅔
	Sash Fasteners, No. 3672, Tokio		66⅔
403.	Sash Fasteners, excepting No. 3532		66⅔
	Sash Fasteners, No. 3532, Tokio		66⅔
404.	Sash Fasteners, No. 950, 951		66⅔
	Sash Fasteners, No. 952-969		66⅔
404.	Sash Fasteners, No. 1052-1069		70
404A.	Sash Fasteners, Change list of No. 1155 to $13.50		70
405-407.	Sash Fasteners		75
408A.	Shaw's Patent Transom Lifters		45
409.	Reiber's Transom Lifters:		
	Bronzed Iron		45
	Bronze Metal, new list		45

Nos.	801	802	803	804	805
3 feet, each.	$3.40	$3.90	$4.20	....	void
4 feet, each.	3.80	4.30	4.70	$6.15	void
5 feet, each.	4.25	4.75	5.25	6.80	void
6 feet, each.	4.75	5.25	5.85	7.50	void
7 feet, each.	5.30	5.70	6.30	8.20	void
8 feet, each.	....	....	6.80	8.85	void
9 feet, each.	....	....	....	9.50	void
10 feet, each.	....	....	....	10.25	void

410.	Sash Centers		65
411.	Shutter Screws and Lifts		60
412.	Stubs and Plates		65
412, 413.	Sash Rollers		65
414.	Shutter sheaves		60&10
414.	Hatfield Patent Sheaves		66⅔
414A.	Sliding Door Sheaves		60&10
414¼.	Sliding Door Stops		60
414¾.	Elastic Base Knobs, Wood		66⅔
414¾.	Elastic Base Knobs, Iron		70&10
415.	Sash Cord Irons		50
415,416.	Axle Pulleys		45
417.	Change the number of Pulleys 108 to No. 418 and add new No. 419, same as 418 with Ground Edges		45

No. 419, inches	1¾	2	2¼
In bulk, per doz	$0.73	.81	.98
In papers, per doz	.75	.83	1.00

418-420.	Axle Pulleys		45
421.	Dumb Waiter Pulleys		60
421.	Ceiling Pulleys		60
422.	Hot House Pulleys		65
423.	Upright Pulleys		65
423.	Side Pulleys		65
424, 425.	Screw Pulleys		65
426.	Incased Screw Pulleys		65
427.	Incased Swivel Pulleys, No. 42		65
427.	Clothes Line Pulleys, Nos. 63 and 163		60&10
428, 429.	Clothes Line Pulleys		60
430.	Clothes Line Pulleys No. 64		60
430.	Tackle or Awning Pulleys		65
431.	Tackle or Awning Pulleys		65
432.	Tackle or Awning Pulleys		65
433.	Well Wheels, Change list of No. 1, 12 in., to $11.25		60
434.	Hay Fork Pulleys		65
435.	Hay Fork Pulleys (No. 272 is void)		70
436.	Brass Pulleys		70&10
437.	Brass Upright Pulleys		70
437.	Brass Screw Pulleys, Nos. 35, 37		66⅔
438-439.	Line Cleats		60
440-443.	Foot Scrapers		50
444.	Japanned Shelf Brackets, No. 40		55
	Japanned Shelf Brackets, No. 44		55
	Japanned Shelf Brackets, No. 48		55
445-452.	Shelf Brackets		60
452-453.	Hand Rail Brackets		60
453.	Hand Rail Plates		60
454.	Hand Rail Screws		66⅔
455.	Washers, 8¾ cents from list		net
455.	Corner Irons		70&10
456.	Hinge Nails		55
457.	Hinge Rivets		45
457.	Wagon Nails		45
458.	Wrought Staples		75
459.	Wrought Staples, Nos. 105, 106, 107		75
460.



L. COES'

GENUINE IMPROVED

Knife Handle

PATENT

Screw Wrenches

MANUFACTURED BY

L. COES & CO.,

Worcester, Mass.

ESTABLISHED IN 1839.

Patented July 6, 1880. Patented July 8, 1884.

Registered March 31, 1874.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.

☞ *Straight Bar, Extra LONG NUT FOR SCREW IN JAW.*

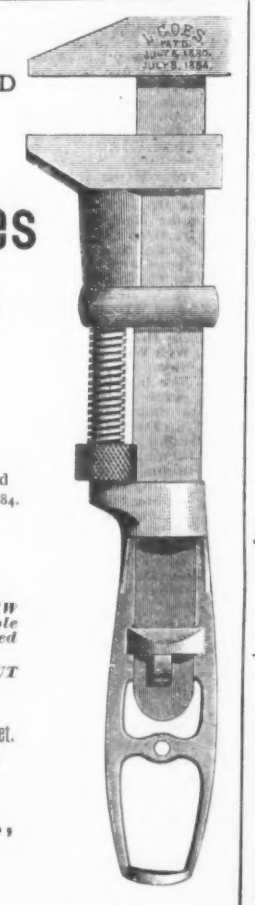
The Best Made and Strongest Wrench in the Market.

Send for Illustrated Price List and Circular.

J. C. McCARTY & CO.,

NEW YORK,

Sole Agents.

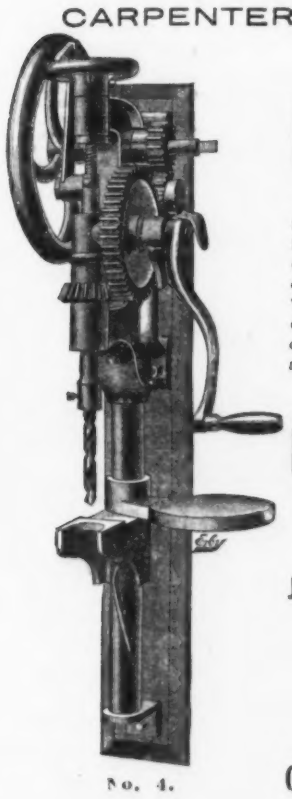


Illinois Iron and Bolt Co

Nos. 20 to 26 Main Street,

CARPENTERSVILLE, KANE CO., ILL.,

MANUFACTURERS OF THE



No. 4.

BAILEY DRILL.

Possesses more points of merit than any other Drill on the market, among which are the following: The entire spindle and feed screw are of Steel. The self-feed may be used or not, as desired, and can easily be changed to slow or fast feed. Table can be fastened at any desired point by an improved cam. Through an intermediate gear, balance wheel may easily be disconnected. Different speeds may be obtained by changing crank from one shaft to another. All parts are interchangeable and every Drill is set in perfect line and tested before shipping.

ALSO OF

BLACKSMITHS' TOOLS,

Patent Steel Wagon Skeins,

JACK SCREWS, TIRE BENDERS, TRACK JACKS,

Carriage Makers' Vises,

SAD IRONS,

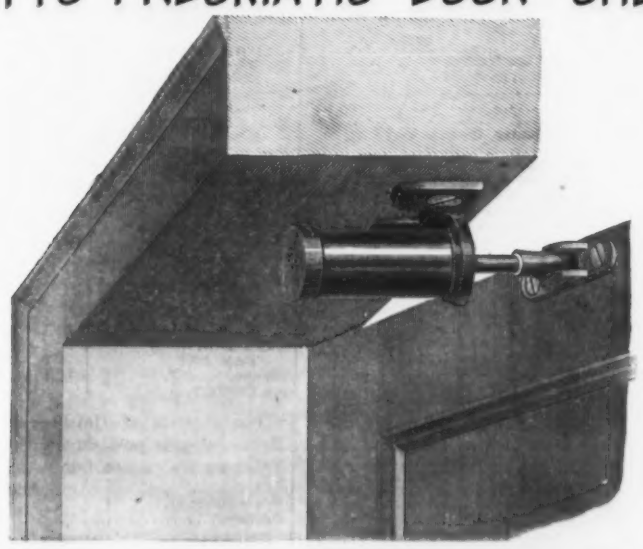
COPYING PRESSES AND STANDS, &c.

WATTS • MANUFACTURING • CO.,

480 PEARL STREET, NEW YORK

SOLE MANUFACTURERS OF THE

WATTS PNEUMATIC DOOR CHECK.



The Latest Improved, Most Simple and Only Reliable Door Check Now on the Market.

It can be applied to either side of the Door or on the casing overhead. In fact, the only universal Air Door Check made that can be sold over the counter, not requiring an expert to put it on. Can be applied by anybody, and are sold at a less price than other Checks. Catalogues and Price Lists furnished on application.

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ESTABLISHED 1859 — BROCKTON, MASS.

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SEND FOR CIRCULAR. — UPRIGHT DRILLS.

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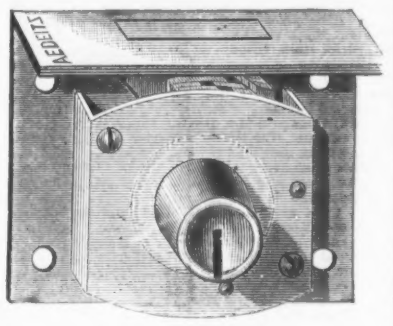

No. 51 Lock.

J. C. McCARTY & CO., Agents,

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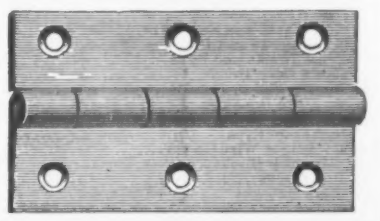
NEW YORK.



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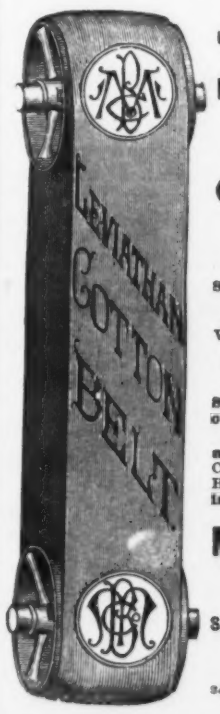

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Main Belting Co.,

Manufacturers of

THE LEVIATHAN

COTTON BELTING.

Unsurpassed for Strength, Durability and Cheapness.

Made to any Length, Width and Strength.

Main Driving Belts.

Guaranteed to Run Straight, Even Throughout.

No Cross Joints, Unaffected by Damp. Clings well to the Pulley. Has no equal. In fact, is THE BELT.

MAIN BELTING COMPANY,

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EXPANDING TAPS

From 3-4 in. to 10 in. Wrought-Iron Pipe Size.

SEND FOR PRICES.

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Manufacturers of

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SAMSON CORDAGE WORKS

SOLID BRAIDED

Window Sash Cord

SEND FOR SAMPLES.

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Manufacturers,

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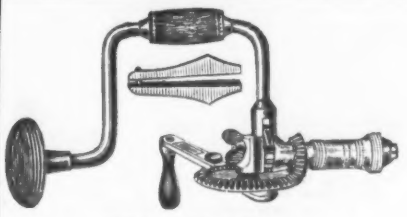
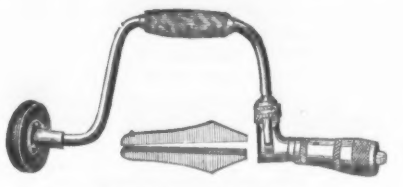


DRILL BRACE.



RATCHET BRACE.

During the year 1885 many new styles of Bit Braces were put on the market, and many old styles were much reduced in quality and price. In face of it all we made our Braces a little better than ever before, and kept our prices steady.

We felt certain that good workmen would buy good tools, and that they would find them in some place. The result bore out our anticipations. Though business generally was not remarkably good, we found at the end of the year that our Brace sales had been larger than ever before.

For the year to come we will make still better goods, sell them at a reasonable price, and trust that our friends, the Dealers, will put them within the reach of all who want them at such prices.

MILLERS FALLS CO.,

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CHAMPLAIN

Forged Horse Nails.

MANUFACTURED BY THE

NATIONAL HORSE NAIL CO.,

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HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST NORWAY IRON AND WARRANTED.

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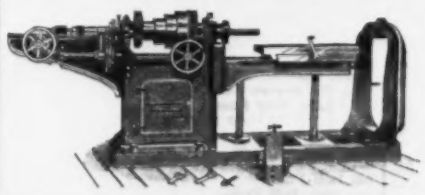
We ask the special attention of the trade to our **C. H. No. 1 Boiler Plates,** which we manufacture expressly for the **Shells** of Steam Boilers and stamp **50,000 pounds T. S.** when desired. **One hundred and sixteen tests** of this iron, made during the last three years by the **U. S. Inspectors of Steam Vessels,** show an **average tensile strength** of **58,808 pounds** to the sectional square inch, and an **average reduction of area** of the fractured section of **30½ per centum.** Our prices are as low as the production of a good article will admit of.



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Double Acting Spring **BUTTS**

SABIN'S LEVER DOOR SPRINGS, Coil, and Sabin's Volute Springs

For various purposes made to order.

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STRONGEST ACME WRENCH *AND BEST*

ALL STEEL CASE-HARDENED JAWS, WARRANTED, MANUFACTURED BY

OWSLEY BROS. & MARBLE, 784 to 794 Madison St., CHICAGO, U. S. A.

Description and Price List Furnished upon Application.

PURE TURKISH EMERY.

WALPOLE EMERY MILLS,

South Walpole, Mass.

THE WEEK.

A paper on the production of aluminium was read at the last annual meeting of the Boston Society of Arts by A. H. Cowles, of Cleveland, and various articles made from aluminium, such as knife blades, screws, faucets, &c., were exhibited. A committee of the Franklin Institute, of Philadelphia, headed by Prof. L. B. Hall, have reported, after examination, that they regard the invention as of the highest importance.

The chairman of the Montreal Harbor Commissioners, in his annual report, mentions the interesting fact that last year more than half of the wheat shipped from that port came by rail to Montreal, and he calls attention to the vast increase in the transportation of grain by rail through New York State as compared with what passed down by the Erie Canal, which "shows that communication all the year round by rail is beating water communications when they are only open for a portion of the year." With a single exception all the grain shipments from Montreal last season were by steamship.

The Sims-Edison Electric Torpedo Co. have been incorporated to manufacture, sell and use torpedoes, torpedo-boats, submarine vessels and war ships, war materials, electric machinery and instruments, dynamo machines, electric cables, wires, motors and lights, and also steam engines, boilers and supplies. The capital stock is $1,000,000, divided into 10,000 shares of $100 each.

About 400 box-makers met in Chicago last week to decide upon an answer to Maxwell Brothers. The men were informed that the firm would accept only one proposition—that the milling machines be kept in the factories. It was unanimously voted by the meeting to adhere to the propositions of the strikers, and not to accept the proposition of the firm.

In an address before the Board of Trade and Transportation last Saturday, Governor Abbett, of New Jersey, made a pungent reference to recent movements of alleged monopolists, as follows: "There is a fight going on in this country between corporations and individuals. There is a banding together of wealth to crush out individual interests. I might say that you have had an instance during the last few days of what combined capital may do and what public sentiment may do when it gets hold of a lot of rascals. I tell you that public sentiment is stronger than capital. Public sentiment is stronger than corporations. Public sentiment is stronger than silence or forgetfulness. If you are true to the individual you will be true to the people and to the country. Public sentiment will triumph, and already we see a general uncloaking of corporate wickedness. Trade and transportation will not always be the sport of knaves and public thieves." Senator Miller, in reply, said something about New Jersey obstructing the Kill von Kull bridge and defying the United States.

The amount paid by the Dominion Government to the Hudson Bay Co. for supplies, transports, commissions, &c., during the Northwest rebellion, was $2,000,000.

The penitentiary authorities at Joliet, Ill., are unable to obtain any bids for convict labor, and conclude that contractors are intimidated by the labor discussions.

The Erie Railway Co. are about to erect commodious depot buildings at Jersey City, of commanding design.

Another new steamer for the North German Lloyd, was launched at the yard of the Fairfield Shipbuilding and Engineering Co., at Govan, near Glasgow, Scotland, on the 18th inst. Her dimensions are as follows: Length 455 feet, breadth 48 feet, depth of hold 36 feet 6 inches. Her tonnage is 5500 tons The engines will be of the triple-expansion pattern, with three inverted cylinders and three cranks; the high-pressure cylinder 44 inches in diameter, the intermediate 70 inches and the low-pressure 108 inches, with a stroke of 6 feet each. The boilers are of steel, and work with a pressure of 150 pounds to the square inch. There are 36 furnaces. The vessel has been built under the inspection of the German Government, and can be used for a cruiser in time of war. She will run between New York, Southampton and Bremen.

A member of the Nicaraguan Government says the Atlantic and Pacific Ship Canal Co. are an extinct corporation, all concessions having been revoked and their steamers and other effects sold at auction in the year 1860, under a decree of the courts.

A number of officers on the Chicago police force have been dismissed on the charge of complicity with striking workmen.

The coal miners at Mansfield, Pa., are attempting to extinguish a fire which is raging underground by sinking a shaft 165 feet and introducing a solution similar to that used in portable fire extinguishers.

The Aqueduct Commissioners voted to have the new aqueduct lined with brick throughout. Mayor Grace and Comptroller Loew opposed this decision as involving an unnecessary expenditure of $1,500,000.

Wire fencing made rabbit-proof, to restrain the movements of this mischievous rodent, is wanted in Australia, the Queensland Government having voted $250,000 to buy it. The Brisbane authorities have accepted tenders for 2550 miles of fencing wire and 450 miles of wire netting of small mesh. A route extending 300 miles, to the intersecting angle of Queensland and New South Wales and thence northward for 100 miles, has been laid out, and it is estimated that 1300 miles of fencing will have to be laid in New South Wales, while in Victoria so great is the demand for wire that the authorities have signified a willingness to forego the duty upon it.

A recent shipment of textile machinery to Central America has been followed by several inquiries from that direction, indicating a widening interest in this department of manufacturing industry.

Captain Eads's ship-railway project does not gain favor in Washington. A dispatch says the longer the committees look at the scheme the more doubtful they become about the advisability of embarking upon another subsidy undertaking that may be freighted with as many evil political consequences as the Pacific Railroad scheme.

The Supreme Court at Trenton, N. J., has decided that the Railroad and Canal Tax law of 1884 is unconstitutional, on the ground that it is a special act, and the Constitution of the State provides for equality of taxation. The selection of railroad property from among all other corporate property for special taxation is therefore unconstitutional. Under the law thus set aside the following was the amount of taxes levied on each railroad company: Pennsylvania Railroad system, $309,524.87; Philadelphia and Reading Railroad system, $233,693.11; New York, Lake Erie and Western Railroad system, $61,622.92; Delaware, Lackawanna and Western Railroad system, $186,049.43; unclassified roads, $173,931.27; total, $964,821.60. Should this decision be sustained the State is already bankrupt, as nearly $1,000,000 must be returned, and there are no other sources of revenue. Moreover, the State Constitution prohibits borrowing beyond $100,000.

The Transcontinental Association, which for some months past have attempted to control freights between the Atlantic Coast and the Pacific, came to an end a week ago, after an exciting conference at the Windsor Hotel, in this city, and a bitter war of rates has already commenced. Not only are the granger goods involved, but the Pacific Mail Steamship Co., with whom the contract for a monthly subsidy of $85,000 has been abrogated, intend to get all the business that it is possible to obtain and run full. With this design the Executive Committee have resolved to establish a weekly line of steamers from New York to San Francisco to purchase an additional vessel and contract for the building of a new one. As to the cause of the disruption, while the Union Pacific and other roads claim that the Atchison, Topeka and Santa Fé forced the Transcontinental Association to dissolve, the Santa Fé replies that while it was working with the pool in good faith the Union and Central Pacific roads were secretly cutting rates by the month and year.

The iron steamer Saxon, built on the Clyde, sprung a leak near Jamaica and sank. Captain Wyman, two officers and three men were lost.

Billions of young cod are being hatched at the Government buildings at Wood's Holl, Mass., to be distributed along the eastern coast, with the expectation of restoring the former abundance of this valuable fish. The various appliances include a steam pump, artificial harbor built of granite, and an oyster pond for propagating the young fry.

James C. Truman, of Binghamton, N. Y., who was appointed the New York commissioner to visit the New Orleans Exhibition, last year, is a strong believer in a world's fair for New York. He thinks it should be held in 1889, just 100 years since George Washington was inaugurated as President. Although the World's Exposition at New Orleans was comparatively a failure, on account of its distance from the center of population, the bank deposits there were increased $15,000,000. It is claimed that a world's fair in New York in 1889 means an attendance of 20,000,000 people, and an increase of deposits in New York banks on account of the exposition of $200,000,000.

An exhibition of endoliths, or artificially colored marbles, in this city excites much interest in some of the trades. By means of pigments, chiefly of metal oxides, it has been found possible not only to color marbles artificially, but to impress upon them designs or ornaments in several colors, which penetrate beneath the surface and become part of the substance of the stone itself. To secure penetration of colors is comparatively easy; the difficulty is to make a line of color enter vertically, or at a right angle to the surface, and go into the substance of the stone without spreading. It is asserted that this difficulty has been overcome, so that now not only flat designs, but delicate gradations or light and shade, may be painted on marble or other dense substances, the molecules of color uniting with the molecules of stone, and making a permanent picture below the surface. White marble is used as the base.

An examination of the various markets tends to show that there has been no large advance in prices corresponding with the advance which has taken place in wages in numerous instances, supposed to average something like 10 per cent. The New York *Commercial Bulletin* says: "Certainly there has been no such advance in wholesale prices. In steel rails and a few other articles the advance has been greater than 10 per cent. In a few manufactured products of some importance an advance of 10 per cent. or less has been realized. But wheat is 8 per cent. lower than it was about July 1, 1885; corn and oats command about the same price, while rye is 12 per cent. lower. Pork is 5 per cent. lower and lard 5 per cent. lower, bacon 11 per cent. lower, live hogs 9 per cent. lower, and tallow 15 per cent. Butter and cheese are higher, as is usual in the winter season. But oil is fully 20 per cent. lower than it was in July. Cotton is about 10 per cent. lower, in spite of the fact that print cloths have advanced 10 per cent. Coffee is 4 per cent. lower, and sugar about the same price. Iron has advanced about 5 per cent., while tin has declined 3 per cent., but copper has risen 12 per cent. and lead 14 per cent. Thus breadstuffs, meats, oil and coal, groceries and cotton are generally lower in price than they were seven months ago, while cotton and woolen goods and metals have generally advanced, though the advance in very few instances has been as much as 10 per cent. Broadly, the range of wholesale prices is lower than it was July 1, and yet the lever of wages is higher, and the prices of manufactured goods and metals are also somewhat higher. Nor is there reason to believe that the margin between wholesale and retail prices has materially widened since last July. The demand for more wages which has been so general appears to be in spite of a lower cost of living and a lower value of most products of labor."

An Oil City correspondent professes to disclose a plan devised by the Standard Oil Co., in expectation of controlling the market in Russia. The writer says: "I am told by a veteran oil man that the big monopoly is gunning for game of such size as the Noble Brothers and their Russian petroleum field. He says they have got things in shape to depress the crude market much lower, and that they will undoubtedly do it. Refined will be marked down as well, and with cheap American oil the present Russian markets will be invaded with all the push that the Standard is capable of, until the Nobles come to terms. The Noble company is known to be on the short tack, with imminent danger of defaulting interest on its bonds, which were floated to the extent of several million roubles in the European capitals, principally Berlin, about two years ago. This is the factor counted on in bringing the Swiss-Russian princes on their knees to Mr. Rockafeller. As the scheme is outlined, the Standard proposes to guarantee this interest, if it is given control of the business in Russia, and then to shut down all works there, thus enabling it to put refined to any price it pleases."

The city of Philadelphia has commenced a suit to recover about $40,000 from Thos. R. Brown, ex-chief engineer of the city gas works, that being the difference between the list price of castings, pipe and other materials purchased by him and the actual market price after making the discounts invariably allowed, from which it is alleged the city derived no benefit.

Plans for a million-dollar hotel to contain 1000 rooms are being prepared by Architect J. B. Legg, of St. Louis. Several New York capitalists are interested. It will be 160 feet square and seven stories in hight, with a central courtyard, and be built of brick and terra-cotta. On the roof will be a grand promenade.

General Negley, of Pittsburgh, in his statement before the committee at Washington in favor of the improvement of the Allegheny and Monongahela rivers, represented that there are 80 iron furnaces in Western Pennsylvania, which manufacture over 350,000 tons of pig iron. The river banks on both sides, and extending upward for 6 miles, were lined with factories, and an abundance of water at all seasons would contribute largely to the convenience of owners and facilitate the transportation of products from different points. Pittsburgh was also the center of natural-gas developments, there being invested already nearly $3,000,000 in natural-gas plants, piping, &c.

Chinese merchants in San Francisco represent to the authorities at Washington that their countrymen on the Pacific Coast are suffering inexpressibly from mob violence, and it is intimated that the Imperial Government will soon present to the United States heavy claims for indemnity.

The Commissioners of Emigration have forwarded their annual report to the Legislature. Of the 281,177 steerage passengers who passed through Castle Garden during the year, 97,913 were Germans, 35,277 Irish, 25,657 English, 16,835 Russians, 16,045 Swedes and 15,740 Italians. The avowed destination of 83,839 immigrants was this State. Illinois received 35,308 of the immigrants, and Pennsylvania 26,621.

Messrs. Napier & Sons, of Glasgow, have entered into a contract to build for the Russian Government three sets of twin-screw engines for cruisers of an improved type, each of 1000 horse-power, with 18 boilers. The hulls are to be built in Russia. The same firm are already constructing for the Russian Government engines of 10,000 horse-power. Another Clyde firm have contracted to build two torpedo rams with a high rate of speed.

A consular report on the exports from the Berlin district to the United States during the past year says that the total movement amounted to $4,529,412, as against $5,813,865 in 1884. During the last quarter of the year the exports amounted to $811,960, as against $867,327 in the corresponding period of 1884.

The new College of Physicians and Surgeons, on Fifty-ninth street, opposite Roosevelt Hospital, for which W. H. Vanderbilt gave $500,000, will cost $250,000.

The Harlem River Bridge Commissioners state that, contrary to report, they have not as yet awarded a contract to the Union Bridge Co., whose plan called for an expenditure of $2,860,000. The bridge, it now appears, will be built according to the specifications of C. C. Schneider, thus reducing the expenditure nearly $1,000,000. The commission, which is composed of Jacob Lorillard, David James King and Vernon H. Brown, forwarded a communication, dated February 16, to the Assembly of the State of New York, in which they say that "the reason the contract was not originally given to Mr. Schneider was that other plans of great merit were submitted, not in competition for prizes; consequently, they were not considered by the commissioners in that connection. We have eliminated all entire masonry structures, whether of natural stone throughout or artificial stone, and have determined upon the erection of a composite stone and iron or steel structure."

The Supreme Court of Pennsylvania, in two decisions rendered the 15th inst., hold that both the Pensylvania and Reading railroads are subject to the provisions of the Constitution of 1874, which requires railroads to "make just compensation for property taken, injured or destroyed by the construction or enlargement of their works, highways or improvements." Judges Paxson and Green dissent from this opinion, being "unable to see how a State can avoid its solemn contract by amending its Constitution." As the railroad companies rest their case on the clause of the Federal Constitution forbidding any State to pass a law impairing the obligations of contracts, the final decision of the cases will doubtless be left to the Supreme Court of the United States.

The House Committee on Railways and Canals authorized Mr. Weber to report favorably to the House his bill directing the Secretary of the Treasury to issue $5,000,000 in bonds to the State of New York to reimburse it for any and all expenditure it may make or may have made since January 1, 1886, in improving the Erie and Oswego canals by furnishing a depth of 9 feet of water, excepting over culverts and aqueducts, over which the depth shall be 8 feet throughout their entire lengths, and by lengthening one tier of all their locks to double their present length, with the exception of those at Lockport. Mr. Weber argues that as seven-eighths of the traffic of the canals comes from the Western States the improvement ought to be borne by the United States, with the proviso that if the State of New York should ever re-enact tolls the United States is to be paid back by the State the amount expended.

The flouring-mill interest of Minneapolis has arranged with the Canadian Pacific officials for a railway connection 400 miles shorter than any now existing, via Sault Ste. Marie.

The Department of State has received a report from United States Consul Dufaise, at Havre, in regard to the foreign trade of France, from which it appears that the imports for 1885 amounted to 4,215,877,000 francs, a decrease of 127,602,000 francs as compared with the imports of 1884. The relative condition of trade up to the month of September of last year was favorable, and then the condition began to change for the worse, and December ended badly. The principal reason of the decline is because of the great depression in the sugar and agricultural interests The exports for 1885 amounted to 3,185,031,000 francs, against 3,232,500,000 francs for 1884. The principal loss is in sugar, jewelry, dresses, silks, breadstuffs, &c. There was an increase in exports of wool and rags. The Government is taking active measures to secure an improvement of trade.

Marvel & Co., shipbuilders, at Newburg, have closed a contract with C. D. Mills, of New York, for a steel seagoing steam yacht of the following dimensions:

Length over all	110 feet
Length on the water line	98 feet
Extreme beam	16 feet
Depth of hold	9½ feet
Draft of water	8 feet
Displacement (in tons)	93.25

She will be constructed of the best quality of Pennsylvania open-hearth steel, the frames to be of 3 x 2½ angles and the plating to average ¼ inch in thickness. Four water-tight athwartship bulkheads will divide her hold into water-tight compartments. The engine will be double compound, the high-pressure cylinder being 18 inches, the low-pressure 10½ inches and the piston stroke 18 inches. The boiler will be 8 x 8, of a patent tubular type, made in this country. She will have an internal surface condenser. The propelling-wheel will be four-bladed, 6½ feet in diameter, with 10-foot pitch. With a working pressure of 120 pounds to the square inch the revolutions of the engine are calculated to be 230 per minute, which will give, it is thought, a speed of 16 miles an hour. This yacht is to cost $30,000.

Jacob Sharp and others identified with the so called "Broadway Railroad grab," under the pressure of investigation by a legislative committee, entered into a contract dated February 2, with certain parties in Philadelphia, to sell 10,000 shares of the stock of the road, at an average price of $292.50 per share. Report said "the syndicate will eventually resolve itself into a corporation to be called the Metropolitan Co., which will purchase, lease and control as many of the present existing lines as they may be able to secure, and particularly the cross-town ones." This design, if really entertained, seems to have been frustrated when Judge Ingraham, of the Superior Court, granted Edward M. Knox an injunction restraining Sharp and his followers from transferring their stock.

The Fall Brook Coal Co., which employ over 1000 men in the bituminous mines of Tioga County, Pa., two years ago adopted stringent rules prohibiting intemperance. Since that time the list of fatalities in the mines have decreased 50 per cent. and the employees all have money ahead.

A Cleveland dispatch says: "Decisive action looking to the settlement of the affairs of Brown, Bonnell & Co. has been taken by Judge Baxter in ordering the sale of the immense plant at Youngstown, Ohio. The firm became involved in financial difficulties, and their business was placed in the hands of a receiver three years ago. It has since then figured in the United States Circuit Court. The claims of the creditors aggregate over $1,000,000. There is a remarkably long list of creditors who had claims against the property. The principal ones are: Sharon (Pa.) National Bank, $108,000; First National Bank of Youngstown, $52,000; Commercial National, of Cleveland, $63,000; Fayette County National, Uniontown, Pa., $52,000; Citizens' National, of Pittsburgh, $61,000, and the Importers' and Traders' National, of New York, $502,000. The capital stock of Brown, Bonnell & Co. was in the neighborhood of $2,000,000, and the larger part of the stock was held by Herbert Ayres's Sons, of Chicago. The great failure of the latter was the immediate cause of Brown, Bonnell & Co.'s suspension, and the crash in Chicago was succeeded in three days by the failure in Youngstown. Brown, Bonnell & Co. were liable as indorsers on $700,000 worth of notes issued by Herbert Ayres & Sons."

The French Government has decided to adhere to its determination to have a universal international exhibition in Paris in 1889.

The ocean tramp steamers arriving at Philadelphia have had their bow plates crushed in by floating ice in several instances this winter, the sheets breaking in "like so much pot-metal." The Delaware-built ships and steam colliers frequenting the port have not lost a single sheet.

The riches of the Congo are spoken of by Dr. A. Sims, a Baptist missionary, who has just returned to Philadelphia after a year's residence in the Congo Free State, and his descriptions agree well with those of Stanley in regard to the commercial advantages presented by that region, which he believes to be unequaled in equatorial Africa, unless by the Niger. In ascending the Locke River he saw native cutlery made by the Southern Soudanese population, virgin forests of the most valuable woods, great rubber wealth as yet untouched, from which immense fortunes must be realized. Everywhere he saw "a vast amount of ivory utterly wasted or applied to base purposes, being used even as chopping blocks." The forests were filled with redwood, worth $150 per ton in European markets, and gum copal is found everywhere in a fossil state. The palm-oil industry promises to be one of the richest on the Upper Congo, the natives being hardy and industrious, and coffee grows wild in profusion. Dr. Sims says the Congo Free State is exerting a great influence over the natives and must succeed.

A fire at Wilmington, N. C., 21st inst., destroyed the general offices of the Atlantic Coast Line and two large freighthouses, the Champion Compass Co.'s works and other property valued at $500,000; insurance, $400,000.

The Reading complications and those of the Morgan syndicate pass through varying phases from day to day, and now there is some reason to believe that President Gowen has obtained by purchase from the Vanderbilts sufficient stock to enable him to defeat the combination formed for his overthow and absorption. The belief is strengthening that in various ways not yet fully understood he has a strong financial backing, including President Garrett, of the Baltimore and Ohio Railroad. According to report, "Reading, under the new arrangement, will be run as an independent corporation. A line will be built as soon as is possible into Pittsburgh, and a new trunk line will be formed between Chicago and the Atlantic seaboard, which will have three termini in the East—Baltimore, Philadelphia and New York—and it is probable that it will stretch directly across the continent to the Pacific Ocean under one harmonious management." But what the outcome of all this will be the wisest confess themselves ignorant.

Current Hardware Prices, February 24, 1886.

HARDWARE.

Ammunition.
Caps, Percussion, ₱ 1000—
Hicks & Goldmark's
F. L. Waterproof, 1-10's.....50¢
E. B. Trimmed Edge, 1-10's.....65¢ } dis 25&
E. B. Ground Edge, Central Fire, 1-10's.70¢ } 25&5 %
Double Waterproof, 1-10's.....$1.40
Musket Waterproof, 1-10's.....50¢
G. D.....28¢
S. B.....50¢
Union Metallic Cartridge Co.
F. C. Trimmed.....50¢
F. L. Ground.....65¢ } dis 25&
Cen. Fire Ground.....70¢ } 25&5 %
Double Waterproof.....$1.40
Double Waterproof, in 1-10's.....$1.40
'S. B. Genuine Imported.....45¢
Eley's E. B.....56¢
Eley's D Waterproof, Central Fire.....$1.60
Cartridges—
Rim Fire Cartridges.....dis 60&2 %
Rim Fire Military Cartridges.....dis 15&2 %
Cen. Fire Cartridges, Pistol and Rifle.....dis 40&2 %
Cen. Fire Cartridges, Military & Sporting..dis 30&2 %
Blank Cartridges, except 22 and 32 cal., an additional 10 % over above discounts.
Blank Cartridges, 22 cal.....$1.50, dis 2 %
Blank Cartridges, 32 cal.....$3, dis 2 %
Primed Shells and Bullets.....dis 25&2 %
B. B. Caps, Round Ball.....$1.60, dis 2 %
B. B. Caps, Conical Ball, Swaged.....$1.75, dis 2 %
Primers—
Berdan Primers, all sizes, and B. L. Caps (for Sturtevant shells).....90¢, dis 2 %
All other Primers, all sizes.....$1.10, dis 2 %
Shells—
Paper Shot Shells, 1st & 2d or S. G. qual.dis 25&5&2 %
Selbold's Combination Shot Shells.....dis 25&10&2 %
Paper Shot Shells, Club, Rival, Climax..dis 40&5&2 %
Paper Shot Shells, Star Brand.....dis 50&5&2 %
Brass Shot Shells, 1st quality.....dis 60&2 %
Brass Shot Shells, Club, Rival & Climax...dis 65&2 %
Wads—
U. M. C. & W. R. A.—B. E., 11 up.....$2.00 }
U. M. C. & W. R. A.—B. E., 9&10.....2.30 }
U. M. C. & W. R. A.—B. E., 7&8.....2.60 } dis 20&2 %
U. M. C. & W. R. A.—P. E., 11 up.....3.10 }
U. M. C. & W. R. A.—P. E., 9&10.....4.00 }
U. M. C. & W. R. A.—P. E., 7&8.....4.90 }
Eley's B. E., 11 up.....$1.75
Eley's P. E., 11 & 20.....$2.80

Anvils.
Eagle Anvils.....₱ ℔ 10¢—dis 20 %
Wright's.....9¾ @ 10¢
Armitage's Mouse Hole.....9¢
Armitage Mouse Hole, Extra.....11¾¢
Trenton.....9¾¢
Wilkinson's.....9¾¢@10¢
J. & Riley Carr Patent Solid.....11@11¾¢
Anvil Vise and Drill—
Millers Falls Co., $18.00.....dis 20 %
Cheney Anvil and Vise.....dis 25 %
Allen Combined Anvil and Vise, $2.50.....dis 40 %
Richardson's Vise and Anvil.....dis 25 %

Apple Parers.
Advance.....₱ doz $4.50
Champion.....₱ doz $7.50
Empire State.....each $9.00
Eureka.....each $12.00
Family Bay State.....₱ doz $12.00
Gem.....₱ doz $5.00
Improved Bay State.....₱ doz $28.00
Improved Penn, 1884.....₱ doz $5.50
Jersey.....₱ doz $5.00
Little Star.....₱ doz $5.00
Model.....₱ oz $4.25
New Lightning.....₱ doz $6.50
Rocking Table.....₱ doz $6.50
Triumph 1883.....₱ doz $6.00
Turntable.....₱ doz $5.00
Two-Knife.....₱ doz $6.50
Waverly.....₱ doz $4.50
White Mountain.....₱ doz $4.75
Whittemore's Perfection.....₱ doz $6.00
Whittemore's Simplicity.....₱ doz $6.00
"72".....₱ doz $4.25
"76".....₱ doz $5.50
"78".....₱ doz $6.50

Augers and Bits.
Douglass Mfg. Co.....dis 70 %
Other First Quality.....dis 60&10&5 @ 70 %
Snell's.....dis 60@60&5 %
Cook's, Douglass Mfg. Co.....dis 55 %
Cook's, New Haven Copper Co...dis 50&10@50&10&5 %
Ives' Circular Lip.....dis 60 %
Patent Solid Head.....dis 30 %
C. E. Jennings & Co., No. 10, extension lip.....dis 40 %
C. E. Jennings & Co., No. 30.....dis 60 %
C. E. Jennings & Co., Auger Bits, in fancy boxes, ₱ set, 32¼ quarters, No 5, $5; No. 30, $3.....dis 20 %
Lewis' Patent Single Twist.....dis 45 %
Russell Jennings' Augers and Bits.....dis 25 %
Imitation Jennings Bits(new list).dis 50&10@50&10&5%
Car Bits, Snell Mfg. Co.....dis 40&10&10 %
Car Bits, New Haven Copper Co.....dis 50&10 %
L'Hommedieu Car Bits.....dis 15 @ 20 %
Snell Mfg. Co.'s Jennings' Bits (new list).....dis 50&5 %
Expansive Bits—
Clark's small, $18; large, $26.....dis 35 @ 35&5 %
Ives' No. 4, per doz., $60.....dis 35 @ 40 %
Swan's.....dis 40 %
Ansonia.....dis 25 %
Steer's, No. 1, $26; No. 2, $22.....dis 35 %
Hollow Augers—
Ives' }
French, Swift & Co. } dis 25&10 %
Douglass' }
Bonney's Adjustable ₱ doz. $48.....dis 40&10 %
Stearns' Adjustable ₱ doz. $48.....dis 20&10 %
Ives' Expansive, each $4.50.....dis 45 @ 50 %
Universal Expansive, each $4.50.....dis 20 @ 25&10 %
Wood's.....dis 25 @ 25&10 %
Gimlet Bits—
Common.....₱ gross $3.00 @ $3.25
Diamond.....₱ doz. $1.10, dis 25&10 %
"Bee".....dis 25 %
Double Cut, Shepardson's.....dis 45 %
Double Cut, Ct. Valley Mfg. Co.....dis 30&10 %
Double Cut, Hartwell's, ₱ gro, $6.50.....dis 10 %
Double Cut, Douglass'.....dis 40 %
Double Cut, Ives'.....dis 50&10&50&10&5 %
Drill Bits—
Syracuse Twist.....dis 30 @ 30&5 %
Hoit's Bit Stock Drills.....dis 25&10 %
Ship Augers and Bits—
L'Hommedieu's.....dis 15 @ 20 %
Watrous's.....dis 15 @ 20 %
Snell's.....dis 15 @ 20 %
Snell's Ship Auger Pattern Car Bits.....dis 15 @ 20 %

Awl Halts.
Sewing, Brass Ferrule.....$3.50 ₱ gross—dis 40&10 %
Patent Sewing, Short.....$1.00 ₱ doz—dis 40&10 %
Patent Sewing, Long.....$1.20 ₱ doz.—net
Patent Peg, Plain Top.....$10.00 ₱ gross—dis 45&10 %
Patent Peg, Leather Top.....$12.00 ₱ gross—dis 45&10 %

Awls, Brad Sets, &c.
Awls, Sewing, Common.....₱ gross $1.70—dis 35 %
Awls, Shouldered Peg...₱ gross $2.45—dis 40@40&10 %
Awls, Patent Peg.....₱ gross 63¢—dis 40@40&10 %
Awls, Shouldered Brad.....$2.70 ₱ gross—dis 35 %
Awls, Handled Brad.....$7.50 ₱ gross—dis 45 %
Awls, Handled Scratch.....$7.50 ₱ gross—dis 35&10 %
Awls, socket Scratch.....$1.50 ₱ doz—dis 25 @ 30 %

Awls and Tools.
Aiken's Sets, Awls & Tools...₱ doz. $10.00—dis 50&10 %
Adj. Tool Handles, No. 1...₱ doz $12—dis 25 @ 25&10 %
Adj. Tool Handles, No. 2...₱ doz $18—dis 25 @ 25&10 %
Henry's Combination Haft.....₱ doz. $6
Brad Sets, No. 42, $10.50; No. 43, $12.50...dis 70&10&5 %
Brad Sets, Stanley's Excelsior, No. 1, $7.50. }
Brad Sets, Stanley's Excelsior, No. 2, $4.00. } dis 30&10 %
Brad Sets, Stanley's Excelsior, No. 3, $6.50. }

Axes.
Best according to brand.....₱ doz $6.50 @ $7.00
Special brands.....$5.50 @ $6.00

Axle Grease.
Fraser's, in bulk.....Keg ₱ ℔, 5¢; Pail, ₱ ℔, 6¢ net
Frazers, in boxes.....₱ gross $9.50 @ $9

Axles.
Nos. 1 to 6.....3¾¢; Short bed, 4¢
Nos. 7 to 18.....dis 60&5@60&10 %
Nos. 19 to 22.....dis 70&5@70&10 %
Nos. 23 to 25.....dis 60&5@60&10 %
Tubular Wrought Steel (National Self-Oiling):
Less than 10 sets.....dis 33⅓ %
Over 10 sets.....dis 33⅓&5 %

Bag Holders.
Sprengle's Pat., ₱ doz $18.....dis 60 %

Balances.
Spring Balances.....dis 50 %
Common 24 ℔.....₱ doz., $1.50—dis 50 %
Chatillon's Spring Balances.....dis 50 %
Chatill n's Circular Spring Balances.....dis 60 %

Bells.
Hand—
Light Brass.....dis 75&10 %
Extra Heavy.....dis 65&10 @ 70 %
White Metal.....dis 70 @ 70&5 %
Silver Chime.....dis 25&10&5 %
Globe (Cone's Patent).....dis 25&10 %
Door—
Song, Abbe's.....dis 25&10 %
Gong, Yankee.....dis 40&10 %
Song, Barton's.....dis 40&10 %
Crank, Taylor's.....dis 25&10 %
Crank, Brooks'.....dis 50&10&2 %
Crank, Cone's.....dis 10 %
Crank, Connel's.....dis 20&10 %
Lever, Sargent's.....dis 60&10 %
Lever, Taylor's Bronzed or Plated.....net
Lever, Taylor's Japanned.....dis 25&10 %
Lever, R. E. M. Co.'s.....dis 50&10&2 %
Pull, Brook's.....dis 50&10&2 %
Pull, Western.....dis 25&10 %
Cow—
Common Wrought.....dis 60&10 %
Western.....dis 20&10 %
Western, Sargent's list.....dis 70&10 %
Kentucky "Star".....dis 20&10 %
Kentucky, Sargent's list.....dis 70&10 %
Dodge, Genuine Kentucky, new list.....dis 70 %

Nos.	0	1	1½	2	3	4	5	6	7	Hog
	$12.00	10.00	9.00	8.00	6 00	5.00	4.00	3.00	2.50	5.00

Texas Star.....dis 50&10 @ 50&10&5 %
Call.....d's 40@40&5 %
Farm Bells.....₱ ℔, 2¾ @ 3¢
Steel Alloy Church and School Bells.....dis 40 %

Bellows.
Blacksmiths'.....dis 50&10@50&10&5 %
Molders'.....dis 50@50&5 %
Hand Bellows.....dis 50@50&5 %

Belting, Rubber.
Standard.....dis 70&5 %
Extra.....dis 60@60&10 %
N. Y. B.& P. Co., Standard.....dis 60 % } dis 5 % cash.
N.Y.B.&P.Co., Ex. Standard..dis 50&10 %
Cleveland Rubber Co., Extra Standard.....dis 60&10 %

Bench Stops.
Hotchkiss's.....₱ doz $5.00—dis 10 @ 10&10 %
Weston's, per doz No. 1, $10: No. 2, $9.....dis 25&10&5 %
McGill's.....₱ doz $3—dis 10 %
Morrill's.....₱ doz $9—dis 50 %

Bit Holders.
Extension, Barber's.....₱ doz $15.00—dis 40&5 %
Extension, Ives'..₱ doz $20.00—dis 40&10 @ 40&10&5 %
Dagonal.....₱ doz $24.00—dis 40 %
Angular.....₱ doz $24.00—dis 40&5 %

Blind Adjusters.
Domestic.....₱ per doz $3.00—dis 30 %
Excelsior.....₱ doz $10.00—dis 50&10&2 %

Blind Fasteners.
Mackrell's.....₱ doz pairs, $1.00—dis 20@20&10 %
Van Sand's Screw Pattern.....$15 ₱ gro.—dis 50&10 %
Van Sand's Old Pattern.....$15 ₱ gro.—dis 50&10 %
Washburn's Old Pattern.....₱ ₱ gro. net
Merriman's.....new list, net
Salisbury & Austin No. 2008.....₱ ₱ gro. net
Security Gravity.....₱ ₱ gro. net

Blind Staples.
Barbed, ½ in. and larger.....₱ ℔ 8 @ 8½¢ net
Barbed, ⅝ in.....₱ ℔ 9 @ 9½¢ net

Blocks.
Tackle Blocks, &c, list April 17, 1885.....dis 20 %
deed Mfg. Co. Self-Lubricating.....dis 50 %

Bolts.
Door and Shutter—
Cast Iron Barrel, Square, &c.....dis 70 @ 70&5 %
Cast Iron Shutter Bolts.....dis 70 @ 70&5 %
Cast Iron Chain (Sargent's list).....dis 65&10 %
Ives' Patent Door Bolts.....dis 55 %
Wrought Barrel.....dis 70 @ 70&5 %
Wrought Square.....dis 70 @ 70&5 %
Wr't Shutter, all Iron, Stanley's list.....dis 60&10 %
Wr't Shutter, Brass Knob, Stanley's.....dis 40&10 %
Wrought Shutter, Sargent's list.....dis 60&10 %
Wrought Sunk Flush, Sargent's list.....dis 55&10 %
Wrought Sunk Flush, Stanley's list....dis 40&10&5 %
Wrought B. E. Flush, Com'n Stanley's list.dis 55&10 %
Carriage—
Com. list June 10, '84.....dis 75&10&5 @ 80&5 %
Genuine Eagle, list Oct., '84.....dis 75 @ 75&5 %
Philа. Pattern, list Oct. 7, '84...dis 75&10@75&10&5 %
R. B. & W., old list.....dis 70&5 %
Tire—
Common, list Feb. 28, 1883.....dis 65&10 %
Am. S. Co., Norway, Ph'l., list Oct. 16, '84.....dis 80 %
Am. S. Co., Eagle, Phil., list Oct. 16, '84.....dis 82½ %
Am. S. Co., Philadel. list. Oct. 16, '84.....dis 82½&5 %
Am. S. Co., Bay State, list Feb. 28, '83.....dis 65&10 %
R. B. & W., Philadel. list Oct. 16, 1884.....dis 80&5 %
R. & E. Mfg. Co.....dis 65&10 %
Stove and Plow—
Stove.....dis 70 %
Plow.....dis 65 %
Am. S. Co. Stove, Annealed.....dis 70 %
Plow.....dis 50&5 %
R. B. & W., Stove.....dis 70&5 %
Machine.....dis 75&10&5 @ 80 %
Bolt Ends.....dis 75&10&5 @ 80 %

Borax.
.....₱ ℔ 8½¢ @ 9¢

Boring Machines.

Without Augers.	Upright.	Angular.
Douglass	$5.50	$6.75.....dis 50 %
Snell's, Rice's Patent	5.50	6.75.dis 40&10&10 %
Jennings	5.50	6.75. dis45@45&10%
Other Machines	2.50	3.00.....net
Phillips' Pat., with Augers	7.00	7.50.....net

Bow Pins
Humason, Beckley & Co.'s, Nos 1 and 2—dis 60&10 @ 60&10&5 %
Humason, Beckley & Co.'s other Nos..dis 70 @ 70&10 %
Sargent & Co.'s.....$17 and $18, dis 60&10 %
Peck, Stow & W. Co.....dis 50&10 @ 50&10&5 %

Braces.
Q. S. Backus.....dis 50&10 @ 50&10&10 %
Barber's, Nos. 10 to 16.....dis 50 %
Barber's, Nos. 30 to 35.....dis 50 %
Barber's, Nos. 40 to 63.....dis 50&10 %
Spofford's.....dis 50&10 %
Ives' Patent Braces.....dis 60@60&10 %
Common Ball, American.....dis 55&10 %
Bartholomew's, Nos. 25, 27, 30...dis 50&10@50&10&10 %
Bartholomew's, Nos. 117, 118, 119.....dis 65 @ 65&5 %
Amidon's Barker's Imp'd.....dis 60@60&10&5 %
Amidon's Corner Brace.....dis 40 @ 40&10 %
Universal.....8 in., $1.90; 10 in., $2.10
Buffalo Ball.....8 in., $1.50 @ $1.55

Brackets.
Shelf, plain, Sargent's list.....dis 55&10 %
Shelf, fancy, Sargent's list.....dis 60&10 %
Reading, plain.....dis 60&10 %
Reading, Rosette.....dis 65&10 %

Bright Wire Goods.
Regular list.....dis 70&10&10 @ 80 %

Broilers.

Henis' Self-Basting..	Inch.....	9	10	9 x 11
	Per doz.....	$4.50	5.50	6.50

Buckets.—See Well Buckets and Pails.

Bull Rings.
Union Nut Co.....dis 55 %
Sargent's.....dis 60&10 %
Hotchkiss' low list.....dis 30 %
Humason, Beckley & Co.'s.....dis 70&10 %
Peck, Stow & W. Co.'s.....dis 50&10 %
Ellerich Hdw. Co., White Metal, low list.....dis 50 %

Butts.
Brass—
Wrought Brass.....dis 75 %
Cast Brass, Tiebout's.....dis 40 %
Cast Brass, Corbin's F. Joint.....dis 33⅓&10@33⅓&10&10 %
Cast Brass, Loose Joint....dis 33⅓&10@33⅓&10&10 %
Cast Iron—
Fast Joint, Narrow.....dis 60&5 @ 60&10&5 %
Fast Joint, Broad.....dis 60&5 @ 60&10&5 %
Loose Joint }
Loose Joint, Japanned }
Loose Joint, Jap. with Acorns. } dis 70&10 @ 70&10&5 %
Parliament Butts. }
Mayer's Hinges. }
Loose Pin, Acorns. }
Loose Pin, Acorns, Japanned. }
Loose Pin, Acorns, Jap, Pltd. Tips... }
Wrought Iron—
Fast Joint Narrow.....dis 60&10&10&2@70 %
Fast Joint, Lt. Narrow.....dis 60&10&10&@70 %
Fast Joint, Broad.....dis 60&10&10&2@70 %
Loose Joint, Broad.....dis 60&10&10&5&2@70&5 %
Table Butts, Back Flaps, &c.....dis 60&10&10&2@70 %
Inside Blind, Regular.....dis 60&10&10&2@70 %
Inside Blind, Light.....dis 60&10&10&2@70 %
Loose Pin, Wrt.....dis 60&10&10&5&2@70&5 %
Loose Pin, Light.....dis 60&10&10&2@70 %
Bronzed Wrought Butts.....dis 40&5@40&10&5 %
Blind Butts—
Parker.....dis 75&2 %
Palmer.....dis 50&5&10 %
Seymour.....dis 70&2 %
Lull & Porter.....dis 80&10 %
Nicholson.....dis 45&10 %
Huffer.....dis 50 %
Clark's, Nos. 1, 3, 5.....dis 80&5 @ 80&10 %
Sargent's, Nos. 1, 3, 5, 11, 13.....dis 75&10 %
Sargent's, No. 12.....dis 75&10&10 %
Reading's Gravity.....dis 75&10 %
Shepard's "Noiseless" Nos. 50, 60, 65, 45 and 55.....dis 75&10 @ 80 %
Shepard's Champion Gravity, No. 75.....dis 80&5&5 %
Shepard's "Gravity," Nos. 1, 3 and 5.....dis 80 %
Shepard's Steamboat Gravity, No. 10.dis 80&10&2½ %
Shepard's "O. S." and "Acme" Lull & Porter.....dis 75&10&5 %
Shepard's "Queen City" Reversible.....dis 75&10 %
Clark's Improved Shutter Hinge, Nos. 0, 1, 1½, 2, 2½, 3.....dis 70 %
North's Automatic Blind Fixtures, No. 2, for Wood, $9; No. 3, for Brick, $10.50.

Butcher's Cleavers.
Humason & Beckley Mfg. Co.....dis 30&5 @ 30&10 %
Bradley's.....dis 25 @ 30 %
Beatty's.....dis 33⅓&5 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

New Haven Edge Tool Co.'s.....dis 40 %
Albertson Mfg. Co.....dis 33⅓ @ 33⅓&5 %

Calipers.—See Compasses.

Can Openers.
Messenger's Comet.....₱ doz $3.00, dis 25 %
American.....₱ gross $3.00
Duplex.....₱ doz 25¢, dis 15 @ 20 %
Lyman's.....₱ doz $3.75, dis 20 %
No. 4, French.....₱ doz $2.25, dis 55 @ 60 %
No. 5, Iron handle.....₱ gross $6.00, dis 45 @ 50 %
Eureka.....₱ doz $2.50, dis 10 %
Sardine Scissors.....₱ doz $7.00, dis 55 %
Star.....₱ doz $5.00, dis 25&5 %
Sprague, No. 1, $2; 2, $2.25; 3, $2.50.....dis 60@60&10 %
World's Best, ₱ gross, No. 1, $12.00; No. 2, $24.00; No. 3, $36.00.....dis 50&10 %
Universal.....₱ doz $3.00, dis 35&5 %
Domestic.....₱ doz $2.50, dis 45 %
Champion.....₱ doz $2.00, dis 50 %

Cards.
Horse and Curry.....dis 10 @ 10&10 %
Cotton.....New list, Aug., 1883, dis 10 %
Wool....." " " dis 10 %

Carpet Stretchers.
Cast Steel, Polished.....₱ doz $3.25
Cast Iron, Steel Points.....₱ doz 80¢
Socket.....₱ doz $1.75
Bullard's.....dis 25 @ 25&10 %

Carpet Sweepers.
Bissell No. 5.....₱ doz $17.00
Bissell No. 7 New Drop Pan.....₱ doz $19.00
Bissell No. 12 Hall Sweeper.....₱ doz $36.00
Grand Rapids.....₱ doz $24.00
Crown Jewel.....No. 1, $18; No. 2, $19; No. 3, $20
Magic.....₱ doz $15.00
Jewel.....₱ doz $17.00
Mystic.....₱ doz $17.00
Cottage.....₱ doz $15.00
Garland.....₱ doz $19.00
Queen.....₱ doz $16.00
Queen, with band.....₱ doz $18.00
King.....₱ doz $30.00

Cartridges.—See Ammunition.

Casters.
Bed. }
Plate. } dis 60 @ 60&5 %
Shallow Socket. }
Deep Socket.....dis 45 @ 50 %
Yale Casters, reduced list May, 1884.dis 25@25&10&5 %
Martin's Patent (Phœnix).....dis 45&10 @ 50 %
Payson's Anti friction.....dis 60 %
"Giant" Truck Casters.....dis 10 @ 10&5 %
Stationary Truck Casters.....dis 45&10

Cattle Leaders.
Humason, Beckley & Co.'s.....dis 75 %
Sargent's.....dis 60&10 %
Hotchkiss.....dis 30 %
Peck, Stow & W. Co.....dis 50&10 %

Chain.
Trace, 6/4-10-2, Eng. sizes...₱ pair 79¢ } dis 50&10 @
Trace, 6/4-10-3, Eng. sizes...₱ pair 70¢ } 50&10&5 %
Trace, 7-10-2, Eng. sizes...₱ pair 86¢ }
Log, Fifth, Stretcher, and other fancy Chains, list Nov. 1, 1884.....dis 50&10 @ 50&10&5 %

American Coil.....	3-16	¼	5-16	⅜	7-16	½
In cask lots.....	$7.75	5.25	4.50	3.75	3.50	3.40

American Coil, less than cask lots, add ¼¢ ₱ ℔.
German Coil, list of June, 1881.....dis 55&5@60 %
German Halter Chain, list of June, 1884.dis 55&5@60 %
Covert Halter, Hitching and Breast.....dis 50&2 %
Covert Traces.....dis 40&2 %
Meneely's Breast, Halter and Hitching.....dis 50&10 %
Meneely's Pat. Sleeve-Snap Breast.....dis 50&10
Oneida Halter Chain (old list).....dis 45 %
Galvanized Pump Chain.....₱ ℔ 5½¢ @ 6¢
Jack Chain, Iron.....dis 70&10 @ 70&10&5 %
Jack Chain, Brass.....dis 70&10 @ 70&10&5 %

Chalk.
White.....₱ gro 55¢
Red.....₱ gro 75¢
Blue.....₱ gro 90¢
White Crayons.....₱ gro 12¢ @ 13¢

Chalk Lines.—See Lines.

Chisels.
Socket Framing and Firmer.....dis 75&10&5 @ 80 %
Douglass & Witherby.....dis 75 @ 75&10 %
Socket Framing and Firmer, Buck Bros.....dis 30 %
Socket Framing and Firmer, Merrill...dis 60&10&10 %
Socket Firmer, Framing, &c., L. & I. J. White..dis 25&5 %
Socket Framing Firmer &c., Crossman.....dis 65&5 %
Tanged Firmers.....dis 50 @ 50&5 %
Tanged Firmers, Butcher's.....$4.75 @ $5.00
Tanged Firmers, Spear & Jackson's.....$5.00 to £
Tanged Firmers, Buck Bros.....dis 30 %

Clamps.
Providence Tool Co.'s Wrought Iron.....dis 25 %
Adjustable, Gray's.....dis 20 %
Adjustable, Lambert's.....dis 20 %
Adjustable, Snow's.....dis 40&5 %
Adjustable, Hammer's.....dis 15 %
Adjustable, Stearns'.....dis 20&10 %
Cabinet, Sargent's.....dis 60&5&10 %
Carriage Makers', Sargent's.....dis 60&5&10 %
Eberhard Mfg. Co.....dis 40&5 @ 40&10 %
Warner's.....dis 40&10 %
Saw Clamps.....See Vises

Clips.
Axle and Spring Bar, Norway Iron.....dis 65&2 %
Wrought-Iron Felloe Clips.....₱ ℔ 5½¢
Steel Felloe Clips.....₱ ℔ 5¢

Coal Hods.
Sidney Shepard & Co.'s list.....dis 45 @ 45&10 %
Iron Clad Mfg. Co.'s and Central Stamping Co.'s list.....dis 70 @ 70&5 %
Whiting & Co., Japanned.....dis 70 %
Whiting & Co., Galvanized.....dis 70&5 %

Coal Vases.
Buffalo Palace, S. S. & Co.....dis 33⅓&10&10 %
Buffalo Common, S. S. & Co.....dis 33⅓&10&10 %

Cockeyes.
.....dis 50 %

Cocks, Brass.
Racking.....dis 65&10 @ 70 %
Globe.....dis 65&10 @ 70 %
Plain Bibbs.....dis 60&10 @ 60&10&5 %
Ale and Beer.....dis 60&10 @ 60&10&5 %

Coffee Mills.
Board and Box.....dis 40&10&2 @ 45&10&2 %
Selsor's Patent.....$9.50, $10.50, dis 25 %
American, Enterprise Mfg. Co.....dis 20&10@30 %
The "Swift," Lane Bros.....dis 20&10 %
Webb's Patent.....dis 45 %

Compasses, Dividers, &c.
Compasses.....dis 60&10&10@70 %
Calipers.....dis 60&10&10@70 %
Dividers.....dis 60&10&10@70 %
Bemis & Call Co.'s Dividers.....dis 60&5 %
Bemis & Call Co.'s Compasses & Calipers....dis 50&5 %
Bemis & Call Co.'s Wing & Inside or Outside.dis 50&5 %
Bemis & Call Co.'s Double.....dis 60 %
Bemis & Call Co.'s (Call's Patent Inside).....dis 30 %
Excelsior.....dis 50 %
Cook's Extension.....dis 25 @ 25&10 %
J. Stevens & Co.'s Calipers and Dividers....d's 25&10 %

Coopers' Tools.
Bradley's.....dis 20 %
Barton's.....dis 20@20&5 %
L. & I. J. White.....dis 20&5 %
Albertson Mfg. Co.....dis 25 %
John Beatty & Co.....dis 33⅓ %

Corkscrews.
Humason & Beckley Mfg. Co.....dis 40 %
Clough's Patent.....dis 33⅓ @ 33⅓&5 %
Howe Bros. & Hulbert.....dis 45 %

Corn Knives and Cutters.
Bradley's.....dis 10 %
Wadsworth's.....dis 25 %

Cradles.
Grain.....dis 40&5&2

Crow Bars.
Cast Steel.....₱ ℔ 3¾¢
Iron, Steel Points.....₱ ℔ 3½¢

Curry Combs.
Fitch's.....dis 50&10 @ 50&10&5 %
Rubber.....₱ doz $10.00, dis 25 @ 30 %

Curtain Pins.
Silvered Glass.....net
White Enamel.....net

Cutlery.
Beaver Falls and Booth's.....dis 33⅓ %
Goodell Co., Table.....dis 35 @ 40 %
Wostenholme.....$7.75 @ $8.00 to £

Dividers—See Compasses.

Dog Collars.
Embossed Gilt, Pope & Stevens' list.....dis 30&10 %
Leather, Pope & Stevens' list.....dis 40 %
Brass, Pope & Stevens' list..dis 40 %

Door Springs.
Torrey's Rod, regular size.....₱ doz $1.45 @ $1.50
Gray's.....₱ gro, $20.00, dis 20 %
Bee Rod.....₱ gro, $20.00, dis 20 %
Warner's No. 1, ₱ doz, $2.50; No. 2, $3.30.....dis 40&10 %
Gem (Coil):
No. 1, Large Japanned.....₱ doz $4.00 }
No. 2, Medium, Japanned.....₱ doz 2.75 } dis 50&10 %
No. 3, Small, Japanned.....₱ doz 2.00 }
Star (Coil)—List
No. 4, ("Shoo Fly") Screen Door size.....₱ doz $1.50
No. 5, Screen Door size.....₱ doz 2.00
No. 6, Medium.....₱ doz 2.75
No. 7, Large.....₱ doz 4.00
Japanned and Coppered.....dis 60 %
Galvanized and Nickel-Plated.....dis 50 %
Victor (Coil).....dis 60 @ 60&10 %
Champion (Coil).....dis 60&10 @ 60&10&10 %
Philadelphia.....5 in., $5.00; 8 in., $7.75, dis 30 %
Cowell's.....No. 1, ₱ doz $18.00; No. 2, $15.00, dis 50 %
Rubber, complete.....₱ doz $4.50, dis 55&10 %
Hercules.....dis 50 %
Shaw Door Check and Spring.....dis 25 @ 30 @ 35 %
Elliott's Door Check and Spring.....dis 25 %

Drawing Knives.
Douglass & Witherby.....dis 75&10&5 @ 80 %
Merrill.....dis 60&10&10 %
Watrous.....dis 15&10 @ 25 %
L. & I. J. White.....dis 20&5 %
Bradley's.....dis 35 %
Adjustable Handle.....dis 20 @ 25 %

Drills and Drill Stocks.
Blacksmiths'.....each, $1.60 @ $1.70
Blacksmiths' Self-Feeding.....each, $7.50, dis 20 %
Breast, P. S. & W.....dis 40&10 %
Breast, Wilson's.....dis 30&5 %
Breast, Millers Falls.....each, $3.00 dis 25 %
Breast, Bartholomew's....each, $2.50, dis 25&10 @ 40 %
Ratchet, Merrill's.....dis 20 %
Ratchet, Ingersoll's.....dis 25 %
Ratchet, Parker's.....dis 20 @ 20&5 %
Ratchet, Whitney's.....dis 20&10 %
Ratchet, Weston's.....dis 20@25 %
Ratchet, Moore's Triple Action.....dis 25 @ 30 %
Whitney's Hand Drill, Plain, $11.00; Adjustable, $12.00.....dis 20&10 %
Wilson's Drill Stocks.....dis 10 %
Automatic Boring Tools.....each, $1.75 @ $1.85

Drill Chucks.
Morse's Beach Patent.....each, $8.00, dis 20 %
Morse's Adjustable.....each, $7.00, d's 20 @ 20&5 %
Danbury.....each, $8.00, dis 30 @ 30&5 %

Dripping Pans.
Per ℔.....5¢ @ 5½¢

Egg Beaters.
Dover.....₱ doz., $2.50
National.....₱ doz $4.50, dis 33⅓ %
Family (T. & S. Mfg. Co.).....₱ gro, $17.00@$18.00
Standard.....₱ gro, $12.00
Kingston.....₱ gro, $9.00
Acme.....₱ gro, $8.00
Triumph (T. & S. Mfg. Co.).....₱ gro, $10.50@$11.50
Advance No. 1.....₱ gro $10.50
Advance, No. 2.....₱ gro $10.00
Bryant's.....₱ doz $1.75
Ayres' Spiral.....₱ gro $5

Emery.
Regular numbers.....₱ ℔ 7¢
Flour and F. F.....₱ ℔ 6½¢
For Emery Paper and Cloth, see Sand Paper.

Enameled and Tinned Ware.—See Hollow-Ware.

Escutcheon Pins.
Iron and Brass, list Nov. 11, 1885.....dis 50&5 %

Escutcheons.
Door Lock.....Same discounts as Door Locks
Brass Thread.....dis 60 @ 60&10 %
Wood.....dis 25 %

Faucets.
Fenn's.....dis 40 %
Rohren's Patent Rubber Ball.....dis 25 %
Fenn's Cork Stops.....dis 33⅓ %
Star.....dis 60 @ 60&5 %
Frary's Patent Petroleum.....dis 33⅓&10 %
West's Patent Key.....dis 50 %
Anchor Lock.....dis 45 %
Metallic Key, Leather Lined.....dis 55&10 @ 60&10 %
Cork Lined.....dis 70 @ 70&10 %
J. Sommer's Best Block Tin Key.....dis 40 %
J. Sommer's Cork Lined, 1st quality.....dis 50 %
J. Sommer's Diamond Lock.....dis 40 %
Self-Measuring, Enterprise...₱ doz $36.00—dis 20&10 %
Self-Measuring, Lane's.....₱ doz $36.00—dis 25&10 %
Self-Measuring, Victor.....₱ doz $36.00—dis 25&10 %

Felloe Plates.
.....₱ ℔ 6½¢ net

Files.
Domestic—
Best brands, list Dec. 1, 1885...dis 55&10@55&10&5 %
Lower Grade, list Dec. 1, 1885.....dis 70 %
J. B. Smith Co. Screw Tang.....dis 55@55&10 %
New Am. File Co., Pat. Tapers, special list...dis 50 %
Imported—
J. & Riley Carr.....List, April 1, 1883, dis 15 %
J. & Riley Carr Horse Rasps.....dis 10 %
Moss & Gamble.....List April 1, 1883, dis 15 %
Butcher.....Butcher's list, dis 20 %
Stubs.....Stubs list, dis 25 @ 30 %

Fluting Machines.
Knox, 4¼-inch Rolls.....$3.25 each } dis 35 %
Knox, 6-inch Rolls.....$3.60 each }
Eagle, 3¼-inch Roll.....$2.15, dis 35 %
Eagle, 5¼-inch Roll.....2.85, dis 35 %
Crown, 4¼-in., $3.50: 6-in, $4.00; 8-in., $6.50 each, dis 35 %
Crown Jewel.....6-in., $3.50 each, dis 35 %
American, 5-in., $3; 6-in., $3.40; 7-in., $4.50 each, dis 35 %
Domestic Fluter.....$1.50 each, net
Geneva Hand Fluter, White Metal..₱ doz $12, dis 25 %
Crown Hand Fluter, Nos. 1, $15; 2, $12.50; 3, $10.00, ₱ doz.....dis 30 %
Shepard Hand Fluter, No. 85.....₱ doz $15.30, dis 40 %
Shepard Hand Fluter, No. 110.....₱ doz $11, dis 40 %
Shepard Hand Fluter, No. 95.....₱ doz $8, dis 40 %
Clark's Hand Fluter.....₱ doz $15.00, dis 33⅓ %
Combined Fluter and Sad Iron...₱ doz $15.00, dis 30 %
Buffalo.....₱ doz $10.00 dis 10 %

Fluting Scissors.
.....dis 45 %

Forks.
Hay, Manure, &c., Asso. list.....dis 60&10&5 %
Hay, Manure, &c., Phila. list.....dis 60 @ 60&5 %
Plated, see Spoons.

Freezers.—See Ice-Cream Freezers.

Fruit and Jelly Presses.
Enterprise Mfg. Co.....dis 20&10 @ 33⅓ %

Fry Pans.
Central Stamping Co.'s list.....dis 33⅓&2 @ —%

No.	0	1	2	3	4	5	6	7	8
₱ doz.	$1.50	1.75	2.00	2.25	2.50	2

Ladles.
Melting, Sargent's ..... dis 55&10 %
Melting, Reading ..... dis 35&10 %
Melting, Monroe's Patent ..... ₱ doz. $4.00, dis 40 %
Melting, P. S. & W ..... dis 35 @ 35&10 %
Melting, Warner's ..... dis 30 %

Lanterns.
Tubular, Standard No. 0. ₱ doz ..... $6.75 @ $7.00
Tubular, Standard No. 1, ₱ doz ..... 8.25 @ 8 50
Tubular, Lift Wire, No. 0, ₱ doz 8.50
Tubular, Lift Wire, No. 1, ₱ doz 10.00
Guards for Tubulars, add ₱ doz 25
Police, Small, $6.00; Medium, $7.25; Large, $9.75
..... dis 10@15 %
Porter's Tin R. R. ..... $10 dis 20 %
Owl ..... $9, dis 20@25 %

Lawn Mowers.—Regular List ..... dis 50

Lemon Squeezers.
Porcelain Lined ..... ₱ doz. $6.00, dis 35&5 %
Wood ..... ₱ doz. $3.00, dis 35 %
Eureka, Tinned ..... ₱ doz. $8.00, dis 10 %
Dunlap's Improved ..... ₱ doz. $3.75, dis 20 ¢
Sammis' ..... No. 1, $5; 2, $9; 12, $18 ₱ doz. dis 25&10 ¢
Townsend's Patent ..... $6.00 ₱ doz., dis 33⅓ ¢
Jennings' "Star" ..... $3.00 ₱ doz. net
The "Boss" ..... ₱ doz. $4.00, dis 10&10 %
Dean's Nos. 1, ₱ doz. $15.00; 2, $8.00; 3, $5.50 ..... dis 55 %
Little Giant ..... dis 50 %
Acme ..... ₱ gross $55.00, dis 50

Lines.
Cotton and Linen Fish, Draper's ..... dis 50 %
Draper's Chalk ..... dis 60 %
Draper's Mason's Linen, 84 ft., No. 1, $1.25; No. 2, $1.75; No. 3, $2.25; No. 4, $2.75; No. 5, $3.25 .. dis 25 %
Cotton Chalk ..... dis 55 %
Silver Lake, Braided, Nos. 0, $6.00; No. 1, $6.50; No. 2, $7.00; No. 3, $7.50 ₱ gross ..... dis 25 %
Masons' Linen, No. 3½, $1.50; No. 4, $2; No. 4½, $2.50
Masons' Colored Cotton ..... dis 45
Wire Clothes, No. 18, $3.50; No 19, $3; No. 20, $2.50.
Ventilator Cord, Samson Braided, White or Drab Cotton ..... $7.50 ₱ doz. dis 20 %

Locks, Padlocks, Cabinet Locks, &c.
Door Locks, Latches, &c.—
List, Dec. 18, 1885 ..... dis 50&2 %
Nimick & Brittan's Burglar-Proof Locks. dis 50& 2%
Reading Hardware Co. (list Feb. 2, 1885). ..... dis 70 %
Perkins' Burglar Proof ..... dis 60&25 %
Piate ..... dis 33⅓&2 %
F. Many's "Extension Cylinder" .... $10.50 ₱ doz net
Barnes Mfg. Co ..... dis 40 %
Yale Flat Key ..... dis 40 %
Dietz Flat Key ..... dis 30 %
L. & C. Round Key Latches ..... dis 40&10 %
L. & J. Flat Key Latches ..... dis 33⅓&10 %
Night Latches ..... dis 20 %
Yale new list ..... dis 40 %
"Shepardson" or "U. S." ..... dis 35 %
"Felter" or "American" ..... dis 40&10 %

Cabinet— Eagle, Gaylord, Parker, Corbin. Changes made in list price of some numbers March 10, 1884, and Jan. 1, 1885, dis 40&2 % cash.
A. E. Deitz ..... dis 30@40 %
Stoddard Lock Co ..... dis 30 %
A. E. Deitz, Flat Key Drawer ..... dis 30@40 %
"Champion" Night Latches ..... dis 40 %
Yale ..... dis 40 %
Barnes Mfg. Co ..... dis 40 %
Eagle and Corbin Trunk ..... dis 25&2 %
"Champion" Cabinet and Combination .... dis 33⅓ %
Romer's ..... dis 25 %

Padlocks— Russell & Erwin, Mallory, Wheeler & Co., Nimick & Brittan Mfg. Co., Wm. Wilcox & Co., Norwich Lock Co. New list Dec. 23, 1884. Dis 66⅔@70&70&10, but prices are very irregular.
Yale Lock Mfg. Co. 8 ..... dis 40 %
Eagle ..... dis 25&2 %
Eureka, Eagle Lock Co ..... dis 40&2 %
Romer's, Nos. 0 to 91 ..... dis 3o %
Romer's, Nos. 200 to 505 ..... dis 20 %
A. E. Dietz ..... dis 35 %
"Champion" Padlocks ..... dis 33⅓ %
Hotchkiss ..... dis 30 %
"Star" ..... dis 15 %
"Horse Shoe," ₱ doz. $9 ..... dis 40 %
Barnes Mfg. Co ..... dis 40 %
Nock's ..... dis 30 %
Brown's Patent ..... dis 25 %
Scandinavian ..... dis 90 %
Fraim's Pat. Scandinavian, new list (low) .... dis 60 %

Lumber Tools.
Ring Peavies, "Blue Line" Finish ..... ₱ doz $20.00
Ring Peaves, Common Finish ..... ₱ doz $18.00
Steel Socket Peavies ..... ₱ doz $21.00
Mall. Iron Socket Peavies ..... ₱ doz $19.00
Cant Hooks, "Blue Line" Finish ..... ₱ doz $16.00
Cant Hooks, Common Finish ..... ₱ doz $14.00
Cant Hooks, Mall. Socket Clasp, "Blue Line" Finish ..... ₱ doz $16.00
Cant Hooks, Mall. Socket Clasp Common Finish ..... ₱ doz $14.50
Cant Hooks, Clip Clasp, "Blue Line" Fin. ₱ doz $14.00
Cant Hooks, Clip Clasp, Common Finish.. ₱ doz $12.00
Hand Spikes ..... ₱ doz 6 ft., $15.00; 8 ft., $20
Pike Poles, Pike & Hook, 12 ft. 14 ft. 16 ft. 18 ft. 20 ft. ₱ doz. $11.50 12.50 14.50 17.50 21.50
Pike Poles, Pike only, ₱ doz 10.00 11.00 13.00 16.00 20.00
Pike Poles, not Ironed, ₱ doz 6.00 7.00 9.00 12.00 16.00
Setting Poles, ₱ doz 14.00 15.00 17.00
wamp Hooks ..... ₱ doz $18.00
Landing Blocks ..... ₱ doz $22.50
Skidding Tongs ..... ₱ doz $51.00
Log Binders ..... ₱ doz $26.00
Bended Boot Calks, 1 to 5 M, dis 25%; 5 to 10 M, dis 30%
Square Steel Boot Calks ..... dis 40 %
Chain Rafting Dogs ..... ₱ 100 $12.50
Ring Rafting Dogs ..... ₱ 100, incl., $10.00; large, $12.00
Timber Grapples ..... ₱ doz $30.00

Lustro.
Four-ounce bottles ..... ₱ doz. $1.75; ₱ gro. $17.00 net

Mallets.
Hickory ..... dis 20&10 %
Lignumvitæ ..... dis 20&10 %
Penfield Block Co, Hickory and L. V. .. dis 30 @ 30&10 %

Mattocks.
Regular list ..... dis 60&10 %

Meat Cutters.
Dixon's—Nos. 1 2 3 4
₱ doz. $14.00 17.00 19.00 30.00—dis 45 @ 45&5 %
Woodruff's ..... Nos. 100 150
₱ doz. $15.00 18.00—dis 45@45&5 %
Champion ..... Nos. 200 300 400
₱ doz. $22.00 27.00 40.00—45@45&5 %
Bales' .... Nos. 11 12 13
₱ doz. $27.00 33.00 45.00 — dis 60&10&10 @ 70 %
American ..... dis 35 %
Nos. 1 2 3 4S
Each $5.00 7.00 10.00 25.00 50.00 60.00
Enterprise ..... dis 30 %
Nos. 10 12 22 32 42
Each $3 00 2.50 4.00 6.00 10.00
Pennsylvania ..... dis 40&10 %
Nos. 1 2 3 00
₱ doz. $24.00 28.00 36.00 28.00
Miles' Challenge. Nos. 1 2 3
₱ doz. $22.00 30.00 40.00—dis 45@45&5 %
Kieser's No. 55 ..... $40 ₱ doz, dis 40 @ 40&10 %
Kieser's Gem ..... $25 ₱ doz, dis 40 @ 40&10 %
Kieser's Monarch ..... $45 ₱ doz, dis 40 @ 40&10 %
Kieser's Butcher ..... $40 each, dis 20 @ 20&5 %
Draw Cut.. Nos. 5 2 6 8 10
Each. $50.00 75.00 80.00 225.00 400.00—dis 20 %
Beef Shavers, Enterprise Mfg. Co. ..... dis 20&10 %
Chadborn's Smoked Beef Cutter ..... ₱ doz, $60.00

Mincing Knives.
Am. (2d quality), ₱ gro, 1 blade, $7; 2 blades, $12; 3 blades, $18 ..... Net
Lothrop's ..... dis 20&10 %
Smith's, ₱ doz, Single, $2.00; Double, $3 ..... dis 40@45 %
Knapp & Cowles ..... dis 50&10@60 %

Molasses Gates.
Stebbins' Pat's ..... dis 70&10 @ 75 %
Stebbins' Genuine ..... dis 66⅔&10 %
Stebbins' Tinned Ends ..... dis 40&10 %
Chase's Hard Metal ..... dis 50&10 %
Bush's ..... dis 20 %
Lincoln's Pattern ..... dis 70&10 %
Weed's ..... dis 20&10 %
Boss Nos.. 1 2 3 4
$7.00 8.00 9.00 10.00.. ₱ doz., dis 60&10&10 %

Money Drawers.—₱ doz., $18.

Nails
Wire Nails, list Nov. 11, 1885 ..... dis 50 @ 50&5 %
Wire Carpet Nails ..... See Tacks

Nail Puller.
Curtiss Hammer ..... ₱ doz $9.00 net
Giant, No. 1 ..... ₱ doz $30.00, dis 10 %
Pelican ..... ₱ doz $9.00, dis 25 %

Nuts and Washers.
Square Nuts, ⅜ and smaller ..... 9½¢ off list
Square Nuts, 7-16 and larger ..... 8½¢ off list
Hexagon Nuts, ⅜ and smaller ..... 10½¢ off list
Hexagon Nuts, 7-16 and larger ..... 9½¢ off list
Washers, ⅜ and smaller ..... 9½¢ off list
Washers, 7-16 and larger ..... 8½¢ off list
In lots less than 100 ℔, ₱ ℔ add ½¢ to list, 1 ℔ boxes, 1¢ to list.

Nut Crackers.
Table (Humason & Beckley Mfg. Co.) ..... dis 40 %
Blake's Pattern ..... ₱ doz $2.00, dis 10 %
Turner & Seymour Mfg. Co ..... dis 50 %

Oakum.
Government ..... ₱ ℔ 7¢
U. S. Navy ..... ₱ ℔ 6½¢
Navy ..... ₱ ℔ 5½¢

Oilers.
Zinc and Tin ..... dis 65@65&10 %
Brass and Copper ..... dis 50&10 %
Malleable (Hammer's), No 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz ..... dis 10 @ 10&10 %
Prior's Patent or "Paragon" Zinc dis 60&5 @ 60&10 %
Prior's Patent or "Paragon" Brass ..... dis 50 %
Olmstead's Tin and Zinc ..... dis 60 %
Olmstead's Brass and Copper ..... dis 50 %
Broughton's Zinc ..... dis 60,4
Broughton's Brass ..... dis 50 %

Packing, Steam.
N. Y. Belting & Packing Co ..... dis 50 @ 50&10 %
American Packing ..... 10@@ 11¢
Russia Packing ..... 11¢
Italian Packing ..... 14 @ 15¢
Cotton Packing ..... 15 @ 18¢

Padlock.—See Locks.

Pails, Galvanized Water.
Quarts 10 12 14
Hill's Light Weight, ₱ doz $2.75 3.00 3.25
Hill's Heavy Weight, ₱ doz 3.00 3.25 3.75
Whiting's 2.75 3.00 3.25
Fire Buckets 2.75 3.25 3.50

Buckets, see Well Buckets.

Pencils
Faber's Carpenters' ..... high list, dis 50 %
Faber's Round Gilt ..... ₱ gro $5.25 net
Dixon's Lead ..... ₱ gro $4.50 net
Dixon's Lumber ..... ₱ gro $6.75 net
Dixon's Carpenters' ..... dis 40&10 %

Picks.
Railroad, 5 to 6, $11.00; 6 to 7, $12 ..... dis 60&10 %
Adze Eye, 5 to 6, $12.00; 6 to 7, $13 ..... dis 60&10 %

Picture Nails.
Brass Head, Sargent's list ..... dis 50&10&10 %
Brass Head, Combination list ..... dis 50&10 %
Porcelain Head, Sargent's list ..... dis 50&10&10 %
Porcelain Head, Combination list ..... dis 40&10 %
Niles' Patent ..... dis 40 %

Pinking Irons ..... ₱ doz 65¢ net

Pipe, Wrought Iron.
1¼ and under, Plain ..... dis 42½ %
1¼ and under, Galvanized ..... dis 32½ %
1½ and over, Plain ..... dis 60 %
1½ and over, Galvanized ..... dis 42½ %
Boiler Tubes ..... dis 52½ %

Planes and Plane Irons.
Wood Planes—
Molding ..... dis 15&2 %
Bench, First Quality ..... dis 20&2 %
Bench, Second Quality ..... dis 25&2 %
Iron Planes—
Bailey's Stanley R. & L. Co.) ..... dis 20&10 %
The Stanley (S. R. & L. Co.) ..... dis 20&10 %
Bailey's "Victor" ..... dis 20&10 %
Steer's Iron Planes ..... dis 35 %
Meriden Mal. Iron Co.'s Iron Planes. ..... dis 20&10 %
Davis's Iron Planes ..... dis 20&10 %
Small extras often given by others.
Plane Irons—
Plane Irons ..... dis 20&10 %
Plane Irons, Butcher's ..... $5.00 @ $5.25 to £
Plane Irons, Buck Bros ..... $5.00 to £
Plane Irons, Middlesex Mfg. Co., "Baldwin Iron" ..... dis 33⅓ %
L. & I. J. White ..... dis 25 %

Pliers and Nippers.
Button's Patent ..... dis 30&10 @ 40 %
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., $13.50; No. 4, 7 in., $21.00 ₱ doz dis 20&10@33⅓ %
Humason & Beckley Mfg. Co ..... dis 50 %
Gas Pliers ..... dis 60 %
Eureka Pliers and Nippers ..... dis 40 %
Russell's Parallel ..... dis 25 %
P. S. & W. Cast Steel ..... dis 50 %
P. S. & W. Tinners' Cutting Nippers .... add 6 % dis 10 %

Plumbs and Levels.
Standard List ..... dis 70&10@70&10&10 %
Disston's ..... dis 45&10 %
Pocket Levels ..... dis 70&10@70&10&10 %
Davis' Inclinometers ..... dis 10&10 %

Poppers, Corn.
Round or Square, 1 qt ..... ₱ gro $14.50 @ $15
Round or Square, 2 qt ..... ₱ gro $25 @ $26

Post Hole and Tree Augers and Diggers.
Samson Post Hole Digger .... ₱ doz $36.00, dis 20&10 %
Fletcher Post Hole Augers .... ₱ doz $36.00, dis 20 %
Eureka Diggers ..... ₱ doz $21 @ $20
Leed's ..... ₱ doz $8.50 @ $9.00
Vaughan's Hollow Tube Post Hole ..... per doz, $24.00 ..... dis 33⅓ @ 20&10&10 %
Kohler's Little Giant ..... ₱ doz $24
Kohler's Heroines ..... ₱ doz $18.00
Kohler's New Champion ..... ₱ doz $10.00
Schneidler ..... ₱ doz $24, dis 2 % cash
Ryan's Post Hole Diggers ..... ₱ doz $24
Cronk's Post Bars ..... ₱ doz $60, dis 50&5 @ 50&10 %

Potato Parers.
White Mountain ..... ₱ doz $5.50
Antrim Combination ..... ₱ doz $8.00
Hoosier ..... ₱ doz $13.50

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw. ₱ doz $18.00 ..... dis 20&10 %
Disston's Pruning Hook ..... ₱ doz $12.00, dis 20&10 %
E. S. Lee & Co.'s Pruning Tools ..... dis 40 %
Pruning Shears ..... ₱ doz $3.75 @ $4.00 net
Henry's Pruning Shears ..... ₱ doz $4.50 net
Wheeler, M. & Co.'s Combination .. ₱ doz $12, dis 20 %
Dunlap's Saw and Chisel ..... ₱ doz $8.50, dis 30 %
J. Mallinson & Co., A. & B. Co. list ..... dis 33⅓ %

Pulleys.
Hot House, Awning, &c ..... dis 66⅔&10 %
Japanned Screw ..... dis 66⅔&10 %
Brass Screw ..... dis 70&10 %
Japanned Side ..... dis 66⅔&10 %
Japanned Clothes Line ..... dis 60&10 %
Hay Fork, Solid Eye, $4.00; Swivel, $4.50 — dis 50&10 @ 50&10&5 %
Hay Fork, "Anti-Friction," 5 in. Solid, $5.70 ... dis 50 %
Hay Fork, "F" Common and Pat. Bushed ..... dis 20 %
Hay Fork, Tarbox Pat. Iron ..... dis 20 %
Shade Rack ..... dis 45 %
Tackle Blocks ..... See Blocks

Pumps.
Cistern, Best Makers ..... dis 50 %
Pitcher Spout, Best Makers ..... dis 60 %
Pitcher Spout, Cheaper Goods ..... dis 70 @ 70&10 %

Punches.
Saddlers' or Drive, good quality ..... ₱ doz 65¢ @ 70¢
Bemis & Call Co.'s Cast Steel Drive ..... dis 50&5 %
Bemis & Call Co.'s Springfield Socket ..... dis 50&5 %
Spring, good quality ..... ₱ doz $2.50 @ $2.60
Spring, Leach's Patent ..... dis 15 %
Bemis & Call Co.'s Spring and Check ..... dis 40 %
Solid Tinners' ..... ₱ doz $1.44, dis 55 %
Tinners' Hollow Punches ..... dis 20&2 %

Rail.
Sliding Door, Wrought Brass ₱ ℔ 35¢, dis 20@25 %
Sliding Door, Bronzed Wrt. Iron ..... ₱ foot 7¢
Sliding Door Iron, Painted .... ₱ foot 4¢, dis 20&10&5 %
Barn Door, Light .... Incn. ¾ 1
Per 100 feet ..... $2.50 3.00 4.40—dis 10 %
B. D. for N. E. Hangers—

	Small.	Med.	Large
Per 100 feet	$2.15	2.70	3.25 net

Terry's Wrought Iron, 5¢ ₱ foot ..... net
Victor Track Rail, 7¢ ₱ foot ..... dis 50&2 %

Rakes.
Cast Steel ..... dis 60&10 @ 60&10&10 %
Malleable ..... dis 60&10 @ 60&10&10 %

Razor.
J. R. Torrey Razor Co ..... dis 20 %
Wostenholme & Butcher ..... $10 to £, dis 10 %

Razor Strops.
Genuine Emerson ..... dis 60 %
Imitation Emerson ..... ₱ doz $2.00, dis 20&10&10 %
Torrey's ..... dis 20 %
Badger's Belt and Combination ..... ₱ doz $2
Lamont Combination ..... ₱ doz $4

Rivets.
Black and Tinned Iron, Flat Head M Rivets (in packages and in bulk) — Block and Carriage (in C packages) — Iron Rivets (other than above) in bulk — Black and Tinned Burrs ..... dis 50 %
Bay State, ordinary, in bulk ..... dis 45 %
Bay State, ordinary, in bulk ..... dis 55 %
NOTE.—Rivets are frequently sold at concessions from above prices.
Copper Rivets and Burrs ..... dis 60&5 @ 60&10 %
Nos. 7 8 9 10 11 12 13 14 15
₱ ℔ .49¢ 50¢ 52¢ 54¢ 56¢ 58¢ 60¢ 65¢ 70¢
Rivet Sets ..... dis 50&2 %

Rods.
Stair, Brass ..... dis 25&5 %
Stair, Black Walnut ..... ₱ doz 50¢

Rollers.
Barn Door, Sargent's list ..... dis 60&10&10 %
Acme (Anti-Friction) ..... dis 55 %
Union Barn Door Roller ..... dis 70 %

Rope.
Manf'rs list, February 6, 1886.
Manila ..... ½ inch and larger ₱ ℔ 12½¢
Manila ..... ⅜ inch ₱ ℔ 13 ¢
Manila ..... ¼ and 5-16 inch ₱ ℔ 13½¢
Manila Tarred Rope ..... ₱ ℔ 12 ¢
Manila, Hay Rope ..... ₱ ℔ 13½¢
Sisal ..... ½ inch and larger ₱ ℔ 10 ¢
Sisal ..... ⅜ inch ₱ ℔ 9½¢
Sisal ..... ¼ and 5-16 inch ₱ ℔ 10 ¢
Sisal, Hay Rope ..... ₱ ℔ 9 ¢
Sisal, Tarred Rope ..... ₱ ℔ 8½¢
Sisal, Single Ply Lath Yarn ..... ₱ ℔ 8 ¢
Cotton Rope ..... ₱ ℔ 15 @ 18¢ net
Jute Rope ..... ₱ ℔ 7¢
Dis 1 to 1½¢ ₱ ℔

Rules.
Boxwood ..... dis 80&10 %
Ivory ..... dis 55 @ 55&10 %
Stephens' Ivory ..... dis 50 %

Sad Irons.
From 4 to 10, at factory .... ₱ 100 ℔ $2.35 @ $2.50
Self-Heating ..... ₱ doz. $9.00 net
Self-Heating, Tailors' ..... ₱ doz. $18.00 net
Gleason's Shield and Toilet ..... dis 25 %
Mrs. Pott's Irons, Double Pointed ..... dis 40 @ 40&5 %
Mrs. Pott's Irons, Square Back ..... dis 40 @ 40&5 %
Enterprise Star Irons, new list, July 20, 1882 .... dis 35 %
Combined Fluter and Sad Iron ... ₱ doz. $15.00, dis 15 %
Fox Reversible, Self-Fluter ..... ₱ doz., $24.00 net
Chinese Laundry (N. E. Butt Co.) ..... 85¢, dis 15 %
New England ..... 50¢, dis 15 %

Sand Paper and Emery Paper.
Baeder & Adamson's Flint, 00 to 1½ .... $4.50 ₱ ream
Baeder & Adamson a Flint, 2, 2½ & 3 .... 5.00 ₱ ream
Baeder & Adamson's Flint, assorted .. 4 75 ₱ ream
Baeder & Adamson's Star ..... 3.75 ₱ ream
dis 40@45 %
Bloodgood's Flint, Nos. 00 to 1½ ..... ₱ ream $4.50
Bloodgood's Flint, assorted ..... ₱ ream 4.50
Bloodgood's Flint, Nos. 2 to 3 ..... ₱ ream 5.00
Bloodgood's Flint, No. 3½ ..... ₱ ream 5.50
Columbia Flint, all Nos ..... ₱ ream 4.00
Madison Mills Flint, all Nos ..... ₱ ream 3.75
dis 40@45 %
Emery Paper, 00 to 1½, $6.50; 2, $7.50; 2½, $9.50 ..... dis 40 @ 45 %
Emery Cloth, B. A. & Co., 00 to 1½, $18; 2, $20; 2½, $24 ..... dis 40 @ 45 %
Emery or Crocus Cloth, Sibley, 9x11½ in., $16.00 — Emery or Crocus Cloth, Sibley, 7x9 in., $10.50 — dis 20 %
New England, same list as B. & A. Flint ... dis 40 @ 45%
Sand Paper without brand ..... ₱ ream, $1.75 @ $2

Sash Cord.
Common ..... ₱ ℔, 12½¢ @ 13¢ net
Patent ..... ₱ ℔, 15¢ @ 16¢ net
White Cotton Braided, fair quality ..... ₱ ℔ 28¢ @ 30¢
Common Russia Sash ..... ₱ ℔ 14¢
Patent " " ..... " 13¢
Cable Laid Italian " ..... " 36¢
India Cable Laid " ..... " 14¢
Silver Lake, A Quality, White ..... 50¢, dis 10&10 %
Silver Lake, A Quality, Drab ..... 55¢, dis 10&10 %
Silver Lake, B Quality, White .. 50¢, dis 10&10&10&30 %
Silver Lake, B Quality, Drab .... 55¢, dis 10&10&10&30 %
Silver Lake, C Quality, White (only) ..... 28¢ @ 29¢
Sylvan Spring, A Quality, 50@55¢. dis 10&10@10&10&10%
Samson, Braided, White Cotton ..... 50¢ dis 20 %
Samson, Braided, Drab Cotton ..... 55¢ dis 20 %
Samson, Braided, Italian Hemp ..... 55¢ dis 20 %
Samson, Braided Linen ..... 80¢ dis 20 %

Sash Locks.
Clark's No. 1, $10.00; No. 2, $8.00 ₱ gross ..... dis 33⅓ %
Ferguson's ..... dis 33⅓ %
Morris ..... dis 50&10 %
Morris' Triumph, list Jan. 1, 1886 ..... dis 50&10 %
Walker's ..... dis 10 %
Attwell Mfg. Co ..... dis 25 @ 33⅓ %
Hammond's Window Springs ..... dis 40 %
Common Sense, Japanned, Copperes' and Bronzed ..... ₱ gross
Common Sense, Nickel Plated ..... ₱ gross $12.00 net
Universal ..... dis 30 %
Kempshall's Gravity ..... dis 60 %
Kempshall's Model ..... dis 60@60&10 %
Corbin's Daisy ..... dis 60&5@60&10 %
Payson's Perfect ..... dis 50&10&5 @ 60 %
Hugunin's New and Improved Adjustable Sash Balances, list March, 1885 ..... dis 33⅓ %
Hugunin's New Sash Locks, list March, 1885.. dis 33⅓ %
Stoddard "Practical" ..... dis 10 %
Ives Patent ..... dis 55 %
Liesche's Nos. 100 & 110, ₱ gro, $8; 105, $10. dis 20&10 %

Sash Weights.
Solid Eyes, in ton lots ..... ₱ ton, $20

Sausage Stuffers or Fillers.
Miles' "Challenge" ..... ₱ doz. $20, dis 45@45&5 %
Perry ..... ₱ doz. No. 1, $15; No. 0, $21, dis 45@45&5 %
Draw Cut No. 4 ..... each, $30.00, dis 20 %
Enterprise Mfg. Co ..... dis 20&10 @ 30 %
Silver's ..... dis 25 %

Saws
Disston's Circular, Mill and Cross Cut ..... dis 45&10 %
Disston's Hand, Panel, Rip, &c ..... dis 20&10 %
Atkins' Silver Steel Circular ..... dis 40 %
Atkins' Selected Steel Circular ..... dis 50 %
Atkins' Silver Steel Diamond X Cuts ..... ₱ foot 75¢
Atkins' Concave Tooth Dexter X Cuts ..... ₱ foot 55¢
Atkins' Special Steel Diamond X Cuts ..... ₱ foot 34¢
Atkins' Champion Tooth X Cuts ..... ₱ foot 32¢
Atkins' Hollow Back X Cuts ..... ₱ foot 22¢
Atkins' Band ..... dis 25 %
W. M. & C. Hand ..... dis 30 @ 30&5 %
W. M. & C. Champion X Cuts. Regular ..... ₱ foot 26¢
W. M. & C. X Cuts, Thin Back ..... ₱ foot 29¢
Peace Circular and Mill ..... dis 45&10 %
Peace Hand Panel and Rip ..... dis 20&10 @ 20&10&5 %
Peace Cross Cuts, Standard ..... ₱ foot 25¢
Peace Cross Cuts, Thin Back ..... ₱ foot 28¢
Peace Band Saws, all widths ..... dis 20&10 %
Richardson's Circular ..... dis 40 %
Richardson's Mill ..... dis 45 %
Richardson's X-Cuts, No. 1, 30¢; No. 2, 27¢; No. 3, 25¢
Richardson's Hand, Panel, Butcher, &c ..... dis 25&5 %
Boynton's Lightning X Cuts ..... ₱ ft 32¢
Boynton's Lightning One Man X Cuts .. ₱ ft 38¢ @ 40¢
Boynton's Lightning Buck Saws ..... ₱ doz $6.00
Hack Saws—
Griffin's Hack Saws, complete ..... dis 40&10 %
Griffin's Hack Saw, Blades only ..... dis 40&10 %
Star Hack Saws and Blades ..... dis 25 %

Saw Frames.
White, Vermont ..... ₱ doz $1.50, dis 25&10 %
Red, Polished and Varnished ..... ₱ doz $1.50, dis 10 %
Saw Rods ..... $10 list dis 10&10 %

Saw Sets.
Stillman's Genuine ... ₱ doz $5.00 and $7.75, dis 40&5 %
Stillman's Imita.. ₱ doz $3.25 and $5.25, dis 40&5@40&10%
Common Lever ..... ₱ doz $2.00, dis 40&5 %
Leach's ..... No. 0, $8.00; No. 1, $15.00, dis 15 %
Nash's ..... dis 20&10 @ 20&10&10 %
Hammer, Hotchkiss ..... $5.50, dis 10 %
Hammer, Bemis & Call Co.'s new Patent ... dis 30&5 %
Bemis & Call Co.'s Lever and Spring Hammer. dis 30&5 %
Bemis & Call Co.'s Plate ..... dis 10 %
Bemis & Call Co.'s Cross Cut ..... dis 12½ %
Aiken's Genuine ..... $13.00, dis 50&10 %
Aiken's Imitation ..... $7.00, dis 55&5 %
Hart's Patent Lever ..... dis 20 %
Disston's Star, $9. No. 15 Hammer, $5.50 ... dis 20&10 %
Atkins' Adjustable ..... per doz $6.00
Atkins' Criterion ..... per doz $7.00
Morrill's. No. 1, $15.00; Nos. 3 and 4, $24 ..... dis 40&10 %
Croissant (Keller). No. 1, $15.00; No. 2, $24.00, dis 33⅓&10 %
Boynton's No. 1, $12 ₱ doz; No. 2, $10 ..... dis 25 %

Saw Tools.
Atkins' Patent ..... per doz sets $6.00

Scales.
Hatch, Counter, No. 171 ..... ₱ doz $42.00, dis 50&10 %
Hatch, Tea, No. 161 ..... ₱ doz $15.00, dis 50&10 %
Union Platform, Plain ..... $2.15 @ 2.20
Union Platform, Striped ..... $2.30 @ 2.40
Chatillon's Grocers' Trip Scales ..... dis 50 %
Chatillon's Eureka ..... dis 25 %
Chatillon's Favorite ..... dis 40 %
Family, Turnbull's ..... dis 30@30&10 %

Scale Beams.
Scale Beams, List of Jan. 12, 1882 .. dis 60&5 @ 60&10 %
Scale Beams, Custer ..... dis 25 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.) $6.50, dis 20&10 %
Box, 1 Handle ..... ₱ doz $4.00, dis 10 %
Box, 2 Handle ..... ₱ doz $6.00, dis 10 %
Defiance Box and Ship ..... dis 20&10 %
Foot ..... dis 50&10@60 %
Ship, Common ..... ₱ doz $3.50 net
Ship, Providence Tool Co ..... dis 10 %

Screen Corners.
Porter's Pat. Window and Door Frame ..... dis 33⅓ %
Screen Corner Irons, Warner's ..... dis 33⅓ %

Screw Drivers.
Douglas Mfg Co ..... dis 20&10&10 %
Disston's ..... dis 45&10 %
Disston's Patent Excelsior ..... dis 45&10 %
Buck Bros ..... dis 30 %
Stanley R. & L. Co.'s Varnished Handles ... dis 60&10 %
Stanley R. & L. Co.'s Black Handles ..... dis 50&10 %
Sargent & Co.'s Nos. 1 & 20 Forged Blade .. dis 70&10 %
Sargent & Co.'s Nos. 40 & 30, Cast Steel .... dis 60&10 %
Sargent & Co.'s No. 60, Round Blade ..... dis 60&10 %
Knapp & Cowles' No. 1 ..... dis 60 @ 70 %
Knapp & Cowles' No. 1 Extra ..... dis 60 @ 60&10 %
Knapp & Cowles' No. 00 & 4 .... dis 50&5 @ 50&10 %
Sets Interchangeable ..... ₱ doz $18.00, dis 25 %
Champion ..... dis 25 %
Clark's Patent ..... dis 20&10 @ 33⅓ %
Crawford's Adjustable ..... dis 30 %
Knapp & Cowles' Screw-Driver Bitts ..... ₱ doz 90¢
Ellrich's Socket and Ratchet ..... dis 25 %
Allard's Spiral, new list ..... dis 25 %

Screws.
Wood Screws—List, February 15, 1886.
Flat Head Iron ..... dis 75&10 %
Round Head Iron ..... dis 70&10 %
Flat Head Brass ..... dis 75 %
Round Head Brass ..... dis 70 %
Flat Head Bronze ..... dis 75 %
Round Head Bronze ..... dis 70 %
Machine—
Flat Head, Iron ..... dis 60 %
Round Head, Iron ..... dis 55 %
Bench and Hand—
Bench, Iron ..... dis 55&10 @ 55&10&10 %
Bench, Wood, Beech ..... ₱ doz $2.25
Bench, Wood, Hickory ..... dis 20&10 %
Hand, Wood ..... dis 25&10 @ 25&10&5 %
Lag or Coach ..... dis 75&10 @ 80 %
Coach, Patent Gimlet Point ..... dis 75 @ 75&5 %
Bed ..... dis 25&5 %
Hand Rail, Sargent's ..... dis 66⅔&10 %
Hand Rail, Humason, Beckley & Co.'s ..... dis 70 %
Hand Rail, Am. Screw Co ..... dis 70 %

Scroll Saws.
Lester, complete, $10.00 ..... dis 25 %
Rogers, complete, $4.00 ..... dis 25 %

Scythes.
Grass Scythes—
Clipper, Full Polished, Boxed & Sharp .. ₱ doz $8.90
German, Cast or Silver Steel, either Half Set or Waldron, in Straw ..... ₱ doz $8.35
Grass Scythes—
Silver Clipper, Boxed and Sharp ..... ₱ doz $7.00
German Steel, Half Set Waldron ..... ₱ doz $6.10
Cast Steel and German Steel, Full Set or Waldron, Sharp and Boxed ..... ₱ doz $6.70
Bush, Bramble and Weed ..... ₱ doz $6.70
Clover ..... ₱ doz $7.00
Imperfect Grass and Bush ..... ₱ doz $5.00
Imperfect Grain ..... ₱ doz $6.70
Lawn—same price as corresponding finish.

Scythe Snaths ..... dis 40&5&2 %

Shears.
American (Cast) Iron ..... dis 75&10 @ 75&10&5 %
Pruning ..... See Pruning Hooks and Shears
Barnard's Lamp Trimmers ..... ₱ doz $3.75
Tinners' ..... dis 20&2 %
Seymour's, List, Dec., 1881 ..... dis 60&10&5 %
Heinsch's, List, Dec., 1881 ..... dis 60&10 %
Heinsch's Tailor's Shears ..... dis 33⅓ %
First quality C. S. Trimmers ..... dis 80 %
Second quality C. S. Trimmers .. dis 80&10 @ 80&10&5 %
Acme Cast Shears ..... dis 10&10 %
Diamond Cast Shears ..... dis 10 %
Clipper ..... dis 10&10 %
Victor Cast Shears ..... dis 7½&10 %
Howe Bros. & Hulbert, Solid Forged Steel .. dis 40 %

Sheaves.
Sliding Door—
M. W. & Co., list Dec. 18, 1885 ..... dis 50&2 %
R. & E., list Dec. 18, 1885 ..... dis 60&2 %
Corbin's list ..... dis 60&10&2 %
Patent Roller ..... dis 60&10&2 %
Patent Roller, Hatfield's ..... dis 70 %
Russell's Anti-Friction, list Dec. 18, 1885.. dis 60&2 %
Moore's Anti-Friction ..... dis 60 %
Sliding Shutter—
R. & E. list Dec. 18, 1885 ..... dis 60&10&2 %
Sargent's list ..... dis 60&10&10 %
Reading list ..... dis 60&10&10 %

Ship Tools.
L. & I. J. White ..... dis 20&5 %
Albertson Mfg. Co ..... dis 25 %

Shovels and Spades.
Ames' Shovels, Spades, &c., list Nov. 1, 1885 ..... dis 20 @ 20&10 %
Griffith's Black Iron ..... dis 50&10 %
Griffith's Steel ..... dis 60 @ 60&5 %
Griffith's Solid Cast Steel R. R. Goods ..... dis 20 %
Old Colony ..... dis 15 @ 15&10 %
St. Louis Shovel Co ..... dis 20 %
Hussey, Binns & Co ..... dis 20 @ 30 %
Lehigh Mfg. Co ..... dis 50&10 %
Payne Pettebone & Son, list Jan. 2, 1882 ..... dis 50&5 @ 50&10 %
Remington's (Lowman's Patent) ..... dis 30 @ 30&10 %
Rowland's, Black Iron ..... dis 50&10 %
Rowland's Steel ..... dis 60&5 @ 60&10 %

Shot.
Drop, ₱ bag, 25 ℔ (2¢ off for cash in 10 days) $1.40

WHOLESALE METAL PRICES, February 24, 1886.

METALS.

IRON.—DUTY: Bars, 8-10¢ to 1 1-10¢ ₩ lb; provided that no Bar Iron shall pay a less rate of duty than 35 %. Sheet, 1 1-0¢ to 1 5-10¢ ₩ lb. Band, Hoop and Scroll, 1¢ to 1 4-10¢ ₩ lb. Railroad Bars weighing more than 25 lb ₩ yard, 7-10¢ of 1¢ ₩ lb.

Standard American Pig Iron.

Foundry No. 1 X	₩ ton	$18.00 @ 18.50
Foundry No. 2 X	₩ ton	17.00 @ 17.50
Gray Forge	₩ ton	16.00 @ 16.50

No. 1 Scotch Pig Iron.

Carnbroe	₩ ton	@ ....
Coltness	₩ ton	20.50 @ 21.00
Shotts	₩ ton	20.00 @ 20.50
Glengarnock	₩ ton	19.50 @ ....
Dartsherrie	₩ ton	20.00 @ 20.50
Langloan	₩ ton	20.50 @ 21.00
Summerlee	₩ ton	19.50 @ 20.00
Dalmellington	₩ ton	19.00 @ 19.50
Eglinton	₩ ton	18.00 @ 18.50
Clyde	₩ ton	18.50 @ 19.00

Rails.

Steel, at Eastern mills	₩ ton	$34.00 @ 34.50
Old Rails, T's	₩ ton	21.50 @ 22.00

Scrap.

Wrought, ₩ ton, from yard		$21.00 @ 21 50

Bar Iron from Store.

Common Iron: ¾ to 1 in. round and square... / 1 to 6 in. x ⅝ to 1 in	₩ lb	1.75 @ 1.80¢
Refined Iron: ¾ to 2 in. round and square... / 1 to 6 in. x ⅝ to 1 in	₩ lb	1.9 @ 2.3¢
1 to 6 in. x 1¼ and 5-16	₩ lb	1.95 @ 2.4¢
Rods—¾ and 11-16 round and sq.	₩ lb	1.8 @ 2.3¢
Bands—1 to 6x8-16 to No. 12	₩ lb	2 @ 2.5¢
"Burden's Best" Iron, base price	₩ lb	2.9¢
Burden's "H. B. & S." Iron, base price	₩ lb	2.5¢
Norway Nail Rods		5 @ 6¢

Sheet Iron from Store.

	Common American.	R. G. Cleaned.
Nos. 10 to 16	₩ lb 2.70 @ 3 ¢	3¼¢
17 to 20	₩ lb 3 @	3¼¢
21 to 24	₩ lb 3 @	3¼¢
25 and 26	₩ lb 3.12½ @	3¼¢
27	₩ lb 3.25 @	3¾¢
28	₩ lb 3.37½ @ 3.50	¢ 4 ¢

	B B.	2d qual.
Galvanized, 10 to 20	₩ lb 5 ¢	4½¢
Galvanized, 21 to 24	₩ lb 5½¢	5 ¢
Galvanized, 25 to 26	₩ lb 6 ¢	5½¢
Galvanized, 27	₩ lb 6½¢	6 ¢
Galvanized, 28	₩ lb 7 ¢	6½¢
American Russia	₩ lb A, 10¢	B, 9¢
Russia	₩ lb 10 ¢ @	10¾¢
American Cold Rolled B. B.	₩ lb 5 ¢ @	7 ¢

Iron Wire.—(*See Wire.*)

STEEL.—DUTY: Ingots, Bars, Sheets, &c., valued at 4¢ ₩ lb or less, 45 % ad. val.; valued above 4¢ and not above 7¢ ₩ lb, 2¢ ₩ lb; valued above 7¢ and not above 10¢ ₩ lb, 2¾¢ ₩ lb; valued above 10¢ ₩ lb, 3½¢ ₩ lb. *Extras.*—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1½¢ ₩ lb in addition to above; Steel Circular Saw Plates, 1¢ ₩ lb in addition to the above.

American Cast Steel.

For American Steel, see Pittsburgh quotations.

Chrome Steel.

Tool Steel, ordinary sizes, ⅝ to 3 inches, net		10 @ 14¢
Adamantine Shoes and Dies		8 @ ..¢
Magnet Steel		14 @ ..¢

English Steel.

Best Cast	₩ lb	15 ¢
Extra Cast	₩ lb	16½ @ 17 ¢
Circular Saw Plates	₩ lb	14 ¢
Round Machinery, Cast	₩ lb	10 ¢
Swaged, Cast	₩ lb	16 ¢
Best Double Shear	₩ lb	15 ¢
Blister, 1st quality	₩ lb	14 ¢
German Steel, Best	₩ lb	10 ¢
2d quality	₩ lb	9 ¢
3d quality	₩ lb	8 ¢
Sheet Cast Steel, 1st quality	₩ lb	15 ¢
2d quality	₩ lb	14 ¢
3d quality	₩ lb	12½¢

TIN.—DUTY Plates, Sheets, Tagger and Terne, 1¢ ₩ lb; Bars, Block and Pigs free.

Banca	₩ lb	@ 23½¢
Straits	₩ lb 20⅞¢	@ 21¾¢
English	₩ lb 21½¢	@ 22 ¢
Bar	₩ lb 22 ¢	@ 22½¢

Charcoal Tin Plates.

I C 10x14 225 sheets	₩ box	$5.25 @	7.25
I C 12x12 225 sheets	"	5.25 @	7.50
I C 20x28, 112 "	"	10.50 @	14.50
I X 10x14 225 sheets	"	6.25 @	9.25
I X 12x12 225 sheets	"	6.25 @	9.50
I X 14x20, 112 "	"	6.25 @	9.25
D C 12½x17 100 "	"	5.00 @	5.50
D X 12½x17, 100 "	"	6.25 @	7.00
For each additional X add	"	1.25 @	2 00

Coke Tin Plates.

	Best.	Ordinary
C 10x14 } I C 14x20 }	$4.75	$4.65 @ ....
I C 12x12	4.87½	4.75 @ ....
I C 10x20, gutters, 225 sheets	8.00	7.25
I C 20x28, 112 sheets	....	10.25

Terne Plates.

	Prime Char.	2d. quality	Coke.
C 14x20 M. F.	$6.87½ @ 7.00	....	....
I C 14x20 Old Process	....	....	$6.75
I C 20x28 "	....	....	14.00
I C 14x20	$4.75 @ 4.87½	....	....
I X 14x20	6.25 @ 6.75	....	....
I C 20x28	9.25 @ 9.75	8.75	8.62½ @ 8.75
I X 20x28	12.75 @ 14.50	....	....
I C 20x200	18.50 @	....	....

Tin Boiler Plates.

XX 14x26, 2 sheets for No. 7, 112 sheets	@	$12.00
XX 14x28, 2 " " No. 8, "	@	13.00
XX 14x31, 2 " " No. 9, "	@	15.00

COPPER.—DUTY: Pig, Bar and Ingot, 4¢: Old Copper, 3¢ ₩ lb. Manufactured (including all articles of which Copper is a component of chief value), 35 % ad valorem.

Ingot, Lake	₩ lb	11¾¢ @ 12 ¢
Ingot, Baltimore	"	11 ¢ @ 11¼¢
Ingot Anchor	"	11¼¢ @ 11½¢
Braziers' Copper and Sheathing, ordinary sizes, 16 oz. ₩ sq. ft. and over	....	@ 16 ¢
Braziers' Copper and Sheathing, ordinary sizes, under 16 oz. and over 12 oz. ₩ sq. ft.	"	@ 17 ¢
Braziers' Copper, 10 oz. and 12 oz. ₩ sq. ft.	"	@ 19 ¢
Lighter than 10 oz. ₩ sq. ft.	....	@ 21 ¢
Circles less than 84 in. in diam.	"	@ 21 ¢
" 84 in. diam. and over	"	@ 24 ¢
Segment and Pattern Sheets	"	@ 21 ¢
Locomotive Fire-Box Sheets	"	@ 20 ¢
Bolt Copper	"	@ 16 ¢
Copper Bottoms	" 19	@ 20 ¢
Nickel Plated Sheathing	"	@ 36 ¢
" " for boilers	"	@ 38 ¢
Plating extra	" 26 ¢	@ 38 ¢
Flat Copper Boiler Bottoms or Pit Bottoms, cut to special sizes	"	@ 22 ¢

Tinning.

14x48, each	₩ sheet, 6¢
14x48, less than case, each	" 12¢
Boiler sizes, 7 and 8 in., each	" 12¢
Boiler sizes, 9 in., each	" 15¢
Other sizes not larger than 30x60	₩ sq. ft., 2½¢
Larger than 30x60	" 5¢

Silver-Plated Sheet Copper for Amalgamating, prices furnished upon application.

For tinning both sides, double the above amount.

O'Neill's Patent Planished Copper.—Net.

14x48

14 and 16 oz. and heavier	27¢	By the case. ₩ lb 26¢
12 oz. and lighter	30¢	" " " 29¢

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x60.

14 and 16 oz. and heavier	29¢	By the case. ₩ lb 28¢

(And all sizes not over 20 in. wide.)

24x48 and 30x60.

14 and 16 oz. and heavier	₩ lb	31¢
2 oz	"	34¢

Planished Brass same price as Planished Copper

Copper Wire.—(*See Wire.*)

Sheathing Metal.

Yellow Sheathing Metal, ₩ lb .....18¢ @ ....

BRASS AND GERMAN SILVER.

Brown & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

Brass Manufacturers' Price List, January 17, 1884..... dis. 30 @ 30 %

LEAD.—DUTY: Pig, $2 ₩ 100 lb; Old Lead, 2¢ ₩ lb; Pipe and Sheet, 3¢ ₩ lb.

Pig	5 @ 5¼¢
Bar	5¼ @ 5½¢
Pipe	6½¢, dis 20 %
Block Tin Pipe	40¢
Tin Lined Pipe	15¢, dis 20 %
Sheet	7½¢, dis 20 %
Shot, ₩ bag, 25 lb	Drop, $1.40; Buck, $1.65
Chilled Shot, ₩ bag, 25 lb	$1.65

ANTIMONY.

Hallett's	₩ lb 9	@ 9½¢
Cookson	" 9½	@ 10½¢

SPELTER—Duty: Pigs, Bars and Plates, $1.50 ₩ 100 lbs.

American, cash	4⅝ ¢ @ 5¢
Bergenport	9¢

ZINC—Duty: Pig or Block, $1.50 ₩ 100 lbs. Sheet, 2½¢ ₩ lb.

600 lb casks	5.20 @ 5.30¢
Zinc.—Open	6 @ 6½¢
Zinc Tubing	dis. 10 @ 20 %

Zinc Tubing—Dis. 25 %.

Plain	.27
Fancy	.33
Scotch and Extra Patterns	.36

BABBITT METAL.

N. P. U	₩ lb	6¼ @ 7¢
X		.10¢
X X		.15¢
J. B		.20¢

WIRE.

Market Wire.—Put up in 63 lb bundles.

Nos.	00 to 9,	10,	11,	12,	13, 14,	15, 16,	17,	18.
	10	11	11½	12½	14	15	16	
Bright Market Wire						dis	67½	%
" Charcoal						dis	47½	%
" Bale Wire. Nos. 7 to 12						dis	62½	%
Annealed Market Wire						dis	67½	%
" Fence Wire. Nos. 8 and 9								
" Grape Wire. Nos. 10 to 14								
Coppered Market Wire						dis	62½	%
" Bale Wire, Nos. 7 to 12						dis	57½	%
Galvanized Market Wire						dis	57 ½¢	
" Fence Wire								

Stone or Weaving Wire.

Nos.	16	17	18	19	20	21	22	23	24	25	26
Cents	14	15	16	19	20	21	22	23	24	25	26
Nos.	27	28	29	30	31	32	33	34	35	36	..
Cents	28	29	30	32	33	35	37	40	45	55	..

Nos. 16 to 18	dis.	70 @ 70 %
19 to 26	"	70 %
27 to 36	"	75 @ 75 %
Galvanized Stone Wire	"	50 %

Steel Wire.

Cast Steel, Steel Wire list ..... dis. 50 %

Brass and Copper Wire.

Old English Gauge the Standard.—Dis 20 @ 25.

	Common High Brass	Low Brass	Gilding Bronze and Copper.
All Nos. to No. 16, inclusive	$0.22	$0.26	$0.30
No. 17 and 18	.23	.27	.31
" 19 and 20	.24	.28	.32
" 21	.25	.29	.33
" 22	.26	.30	.34
" 23	.28	.32	.36
" 24	.30	.34	.38
" 25	.32	.36	.40
" 26	.35	.39	.43
" 27	.38	.42	.46
" 28	.42	.46	.51
" 29	.45	.49	.54
" 30	.48	.52	.62
" 31	.51	.55	.67
" 32	.55	.59	.78
" 33	.59	.63	.82
" 34	.64	.68	.95
" 35	.70	.74	1.30
" 36	.76	.80	1.50
" 37	1.00	1.04	1.79
" 38	1.30	1.34	2.00
" 39	2.00	2.00	3.25
" 40	2.60	2.60	5.75

Spring Wire, 2 cents per pound advance. Whitened Wire, 3 cents per pound advance. Flat, Square and Half-Round Wire, 4 cents advance on Round Wire. Fancy Wire, not less than 10 cents advance on Round Wire. Spooling on one-pound Spools, 12 cents per pound extra. Spooling on ten-pound Spools or more, 2 cents per pound extra.

MISCELLANEOUS TINNERS' STOCK.

Solder.

⅛ & ¼, Warranted		14 @ 14½¢
Extra		13 @ 13½¢
No. 1 Refined		11½ @ 12 ¢
No. 2 Solder		11 @ 11½¢
Extra wiping		11 @ 11½¢

Rivets.

Iron and Tinned, new list, Dec. 10, 1881	dis. 50 %
In bulk, new list, Dec. 10, 1881	dis. 45 %
Copper Rivets and Burrs	dis. 50&10@60 %

Nos..	7	8	9	10	11	12	13	14	1
₩ lb..	49¢	50¢	52¢	54¢	56¢	58¢	60¢	65¢	70¢

Stove Bolts.

American Screw Co.'s	dis. 65 %
R. B. & W	dis.
R. & E. Mfg. Co	dis. 70 %

FRENCH GLASS.

August 20, 1885. Per Box, 50 feet.

Single Thick.

Sizes.	1st. E F H D	2d. I E H D	3d. H H D	4th. H B D
25 6 x 8 to 10 x 15	$11.50	$10.50	$10.00	$9.50
40 11 x 14 to 16 x 24	18.00	12.25	11.50	10.75
50 18 x 22 to 20 x 30	17.00	16.00	14.50	13.25
54 15 x 36 to 24 x 30	19.00	17.00	15.00	
60 26 x 28 to 24 x 36	20.00	18.50	16.25	
70 26 x 36 to 26 x 44	21.50	20.00	16.50	
80 26 x 46 to 30 x 50	23.50	22.00	19.00	
84 30 x 52 to 30 x 54	25.00	23.00	20.00	
90 30 x 56 to 34 x 56	26.00	24.00	22.00	
94 34 x 58 to 34 x 60	27.50	26.00	23.50	
100 36 x 60 to 40 x 60	31.00	28.00	26.00	

Double Thick.

Sizes.	1st. E F H D	2d. I E H D	3d. H H D	4th. H B D
25 6 x 8 to 10 x 15	$14.00	$13.50	$13.00	$12.25
40 11 x 14 to 16 x 24	17.00	16.00	15.25	14.50
50 18 x 22 to 20 x 30	22.00	20.50	19.00	
54 15 x 36 to 24 x 30	24.00	22.00	20.00	
60 26 x 28 to 24 x 36	26.00	24.00	21.75	
70 26 x 36 to 26 x 44	27.50	26.00	22.50	
80 26 x 46 to 30 x 50	30.00	28.00	24.50	
84 30 x 52 to 30 x 54	31.50	29.00	26.00	
90 30 x 56 to 34 x 56	33.00	30.50	28.00	
94 34 x 58 to 34 x 60	35.00	34.00	31.00	
100 36 x 60 to 40 x 60	38.00	36.00	34.00	

Sizes above—$15 per box extra for every 5 inches. Discount 80 @ 80&5 %.

PAPER STOCK, &c.

(*Dealers' Selling Prices.*)

	Cents	₩ lb.
White Shirt Cuttings, No. 1	6¾ @	7
" " No. 2	5¾ @	6
Mill Assorted Whites	5 @	5¾
Unbleached Muslins	5¾ @	6
City Whites, No. 1	4¾ @	..
City Whites, No. 2	2¾ @	2¾
New Canton Flannels	4½ @	4¾
New Seconds, light	3¾ @	4
" dark	2¾ @	3
Cotton Canvas	4½ @	4¾
Linen Canvas No. 1	4 @	4½
Seconds, City No. 1	1⅜ @	1½
Seconds, City No. 2	1 @	1¼
Colors, ₩ cwt	40 @	50
Manila Rope	3 @	3½
" Tarred	2½ @	2¾
Gunny Bagging, No. 1	1⅝ @	1¾
" No. 2	1½ @	1⅝
Kentucky Bagging	1 @	..
Burlap Bagging, No. 1	1⅝ @	2
Tar Shakings	1⅜ @	2
Hemp Twine Stock	3¼ @	3½
Hard White Shavings, No. 1	3½ @	4
Soft White Shavings, No. 1	2¾ @	3
White Shavings, No. 2, Soft	2½ @	2¾
Mixed Shavings, part White	2¼ @	2½
Ledger and Writing	2¼ @	2¾
Solid Stock	2¼ @	2½
Book Stock, No. 1, light	1 @	1½
Old Newspapers	1¼ @	1¾
Pure Manilas	1¾ @	..
Bogus Manilas and Hardwares, cwt	60 @	100
Commons, ₩ 100 lb	40 @	50
Binders' Board Cuttings	¼ @	⅝
Straw Board Cuttings, ₩ cwt	60 @	70

PAINTS, OILS, &c.

Paints.

Black, Lamp—Coach Painters'	₩ lb 22 @	24¢
" Ordinary	@	6¢
Black Ivory Drop, fair	13 @	15¢
" best	@	20¢
Black Paint, in oil	kegs, 8¢; assorted cans, 11¢	
Blue, Prussian, fair to best	40 @	55¢
" " in oil	45 @	55¢
" Chinese dry	@	70¢
" Ultramarine	18 @	30¢
Brown, Spanish	@	1¼¢
" Van Dyke	10 @	12¢
Dryers, Patent American	asst'd cans, 9¢; kegs, 7c	
Green Chrome	15 @	23¢
" " in oil	14 @ 15 @	25¢
" Paris	good, 20¢; best, 25¢	
" " in oil	good, 30¢; best, 35¢	
Iron Paint, Bright Red	₩ lb	2¾¢
" Brown	"	3¢
" Purple	"	3½¢
Ground in oil, Bright Red	"	5½¢
" " Red	"	5½¢
" " Brown	"	5½¢
" " Purple	"	6¢
Litharge		.6½c
Mineral Paints	2 @	4¢
Orange Mineral		.10¢
Red Lead American	$1.65 @	$1.70
Venetian (Eng.) dry	asst'd cans, 11¢; kegs, 8¢	
" " in oil	9 @	12¢
" Indian Dry	10 @	13
Rose Pink		.4¢
Sienna, American Raw, powdered		4½¢
" Burnt, powdered	10 @ 16 @	20¢
" " in oil	11 @ 15 @	25¢
" Raw	4 @	8¢
Umber, Burnt, powdered	9 @ 12 @	15¢
" " in oil	4 @	7½¢
" Raw, powdered	9 @ 12 @	15¢
" " in oil		.90¢
Vermilion, Chinese	53 @	58¢
" English		.15¢
" American, Common		.6¢
White Lead, American, pure dry	7 @	7½¢
" " in oil	2 @	2½¢
White Paris, English Prime		$1.75
Yellow Ochre, French		.2¢
" " in oil	asst'd cans, 11¢; kegs, 8¢	
" " Vermont	in casks, 1½¢	
Yellow Chrome	17 @	27¢
" " in oil	14 @ 18 @	20¢
Zinc White, American No. 1, dry	6 @	6¢
" " No. 1, in oil		.2¢
" French (Paris Dry)	5½ @	7½¢
" " in oil	10 @	11¢

Oils.

Bleached Whale, ₩ gal	52 @ 53¢
" Sperm, ₩ gal	.98¢ @ $1
" Elephant, ₩ gal	.68¢
Drilling	.40¢
B. & R. Best Valvone Cylinder	.70¢
Engine	.50¢
Fish Oil, Pressed	32 @ 34¢
Lard, Prime Winter	52 @ 53¢
" No. 1 Extra	.49¢
Linseed, Raw, in casks and bbls	44 @ 45¢
" Boiled, " "	48 @ 49¢
" Western, " "	42 @ 43¢
Calcutta	.49¢
Machinery	.40¢
Miners' Oil	35 @ 45¢
Neatsfoot	60 @ 70¢
Signal	.50¢
Tallow	.58¢
West Virginia	11 @ 18¢

Sundries.

Asphaltum, Cuban, ₩ lb	5½ @ 6½¢
" Egyptian	8 @ 9½¢
Benzine	₩ gal. 8½ @ 9½¢
Chalk, ₩ 100 lb	.45¢
" Block	.3½¢
Crucibles No. 14 and upward, per number	.3½ @ 4¢
Grain Emery, 300 lb kegs	.2½¢
Flour Emery, finest quality	.4¢c
Frostings	.24 ₩ 35¢
Glue, White	.20¢
" Sheet	.$4.75
Glaziers' Points, Zinc, ₩ box	.30¢
Gum, Copal	.25¢
" Damar	.30¢
" Shellac, English	.25¢
" " " dark	1 @ 1¼¢
Mineral Wool, ordinary, ₩ lb	3 @ 3½¢
" extra	3 @ 6¢
Pumice Stone, selected Lumps	.2¼ @ 3½
" powdered	$2.25 @ $2.50
Pine Tar, bbls	$1.50
Pitch	.4 @ 6¢
Plumbago E. I. Po., ₩ lb	6 @ 10¢
" American, ₩ lb	.10¢
" Gun Powder Glazing, ₩ lb	.10¢
" Shot Polish ₩ lb	.2½¢
Putty, in bladders	1¾ @ 2
" in bulk	$4.05
Rosin—Common and Good—Strained	$1.40 @ $1.70
" E & F	$1.90 @ $2.25
" G & H	$3.25 @ $3.75
" I & K	$4.75 @ $5.50
" M & N	46½ @ 47½¢
Spirits Turpentine, ₩ bbl	₩ gross $5.50
Stove Polish, Dixon's	" 5.50
" Rising Sun	" 4.00
" Gem	" 3.00
" Jet Black	9¢
Waste, No. 1 Cop	.9¢
" No. 1 White Machine	.8½¢
" No. 2 White Machine	6½¢
" No. 1 Colored	.6¢
" No. 2 Colored	.8½¢
" Washed Machine	.60¢
Whiting, Spanish, ₩ 100 lb	

INTERCHANGEABLE
LOCK-CORNER SHELF BOXES.
Screw Cases, &c.,
FOR THE HARDWARE TRADE
S. H. GREEN,
12 Murray St., New York.

The Woodruff's Patent Celebrated American Suspending Eave Trough Hanger. The Best in the World, And Pulley for Hoisting Trough. "Little Giant" Combined Shear and Punch. Manufactured by Geo. W Heartley, Toledo Spring and Variety Works, 300 St. Clair St., Toledo Ohio.

THE CELEBRATED
S. & F. Putz Pomade
(Polishing Paste).

UNIVERSAL-METALL-PUTZ-POMADE
SCHMITT & FÖRDERER, WAHLERSHAUSEN-CASSEL
Trade Mark
Rub the article to be cleaned with very little of the pomatum on a soft rag, then finish polishing with another dry soft cloth or leather.

FOR SALE BY ALL
Hardware, Stove and House-Furnishing Dealers,
AND BY
F. A. Walker & Co., Boston, Agents for Eastern States. Keith, Benham & Dezendorf, Chicago; Hibbard, Spencer, Bartlett & Co., Chicago; Simmons Hardware Co., St. Louis; Caruth & Brynes Hardware Co., St. Louis; O'Conner & Harder Range Co., St. Louis; T. & A. Pickering, Cincinnati; Buhl, Sons & Co., Detroit; R. Wurlitzer & Bro., Cincinnati; F. H. Loss, Jr., New York.

ESTABLISHED 1853.

POCKET CUTLERY.

The reputation of our Pocket Cutlery has long been established.

We guarantee EVERY BLADE to be HAND FORGED from Messrs. S. & C. Wardlow's "EXTRA SUPERFINE" ENGLISH BAR STEEL.

Every Blade Warranted.

TRADE H & B MARK.

Send for Illustrated Knife List.

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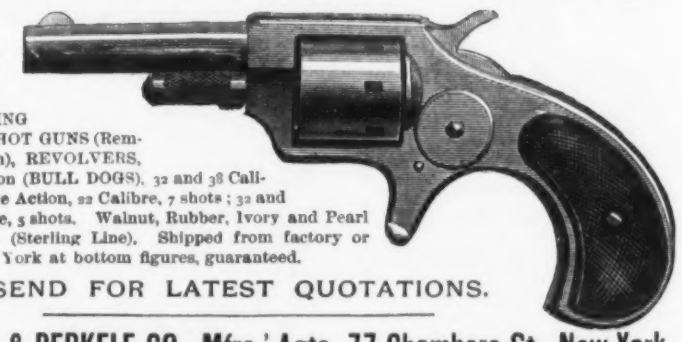
HUMASON & BECKLEY MFG. CO.,

NEW BRITAIN, CONN. 80 Chambers St., NEW YORK CITY.

SOLE and ONLY Agency of the Wm. Rogers Mfg. Co. ever established in the City of New York. V. P. Humason, Agent.

FIRE ARMS.

CONSISTING OF



BREECH LOADING
Single Barrel SHOT GUNS (Remington system), REVOLVERS, Double Action (BULL DOGS), 32 and 38 Calibre: Single Action, 22 Calibre, 7 shots; 32 and 38 Calibre, 5 shots. Walnut, Rubber, Ivory and Pearl Stocks (Sterling Line). Shipped from factory or New York at bottom figures, guaranteed.

SEND FOR LATEST QUOTATIONS.

THE ALFORD & BERKELE CO., Mfrs.' Agts, 77 Chambers St., New York.

P. O. BOX, 2002.

THE JENNINGS & GRIFFIN MFG. CO., Sole Proprietors of the

L'Hommedieu Auger Works.

The Oldest Auger Works in America. Established by Joshua L'Hommedieu in 1818.

MANUFACTURERS OF "L'Hommedieu" { *Ship Augers and Ship Auger Bits, Ship Auger Pattern Car Bits, Single Twist Boring Machine Augers,*

TRACY'S TRENAIL AND SCOTCH PATTERN AUGERS.

These Augers and Bits are designed especially for boring hard wood. Special sizes of Machine Augers and Bits, Turned Shank, Ship Auger Pattern, furnished promptly to order.

N. B.—As inferior Ship Augers are now sold on the market under the impression that they are made by experienced mechanics, we would say that we have at our L'HOMMEDIEU & WATROUS shops the only experienced Ship Auger makers in the United States. We not only have the skilled labor but the best equipped shop for manufacturing this class of goods in the world. Our forging room is entirely new, with new drops, new trip-hammers and every facility in the way of labor-saving tools that can be devised. The "L'HOMMEDIEU" name has been before the public for more than 65 years. Goods bearing the trade-marks of L'Hommedieu or Watrous are fully warranted.

C. E. JENNINGS & CO., 69 Reade and 87 Chambers Sts.

THE WILMOT & HOBBS MFG. CO.,

Cold Rolled Iron and Steel,

For Blanking, Stamping, Cupping and Drawing.

BRIDGEPORT, - - - - - - CONN.

ESTABLISHED 1866

S. CHENEY & SON MANLIUS N.Y.

MANUFACTURERS OF LIGHT AND MEDIUM WEIGHT

GRAY IRON CASTINGS

OF ALL DESCRIPTIONS TO ORDER.

PATTERN MAKING & JAPANNING. CORRESPONDENCE SOLICITED.

ALEXANDER BROS

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PHILADELPHIA.

ELIZABETHPORT STEAM CORDAGE CO.,

MANUFACTURERS OF MANILA, SISAL AND TARRED

CORDAGE OF ALL KINDS.

E. M. FULTON.
D. B. WHITLOCK.
A. W. LUKENS.

BINDER TWINE A SPECIALTY.

46 South Street, NEW YORK.

STEEL EDGE DUST PAN CO.

6 EXCHANGE PLACE, BOSTON.

ALWAYS HAS A STRAIGHT EDGE & FITS CLOSE TO THE FLOOR.

WARRANTED TEMPERED STEEL-EDGE 1¼ IN. WIDE.

THE REIHER IMPROVED
Self-Locking
TRANSOM LIFTER

answers equally well for all Transoms.

Hinged at the top.
Hinged at the bottom.
Hinged at the center.

F. A. REIHER,
Manufacturer,
11 and 13 S. Canal St., Chicago, also 102 Chambers St., N. Y.

Send for catalogue.
Cut showing the parts belonging to the transom lifter:
A. The locking-bar.
B. The self-locking adjusting block.
C. The operating rod.
D. The lower bracket.
E. The lifting arm.
F. The transverse bracket.

INDUSTRIAL ITEMS.

MAINE.

The grinders in the axe and scythe shop at Oakland have struck for a raise of 5 cents a dozen. They now receive 25 cents, and say that as the average life of grinders is only 10 years, with the prospect of being killed at any time by the bursting of a stone, their wages should be proportionely high.

NEW HAMPSHIRE.

The wages of the employees of the Concord Axle Co., at Concord, have been increased 10 per cent.

MASSACHUSETTS.

The Washburn & Moen Co., Worcester, employing over 3000 men, with nearly $150,000 a month pay-roll, have just gone upon the weekly-payment system.

We understand that the Amherst Hydraulic Motor Co., of Holyoke, are now actively at work supplying the rapidly-increasing demand for their motors.

The Presbrey Stove Lining Co., of Taunton, report the amount of past fall trade in fire-bricks and stove linings as having been very satisfactory, and that their January trade starts out with much better prospects than last year. They are now adding one floor 150 x 32 feet to their storehouse and shipping-rooms, which will enable them to stock up more fully for the coming season. Their new and improved kiln, built last summer, surpasses their expectations in point of economy in burning and uniformity of linings produced. From present appearances they will run the works full time throughout the year. As all of the stove-lining manufacturers have on hand smaller stocks than usual, a busy season is anticipated, with a tendency toward higher prices. The annual production of their works is about 275,000 sets of stove, range and furnace linings, and 500,000 fire-brick and shapes, which were shipped to all parts of New England, also to New York and Canada.

The Jarvis Engineering Co., Boston, have received orders to set three new steel tubular boilers, for the Worcester Steel Works, with the Jarvis patent furnace. They will use screenings for fuel to be burnt on the Sheffield grates.

The Ashcroft Mfg. Co. will remove from Boston to their new shops in Bridgeport, Conn., about April 1. A Babcock & Wilcox boiler will furnish steam for the testing-room and for three Westinghouse engines, and will take feed-water from a Davis pump through a Goubert purifier.

The Lawrence Machine Co., of Lawrence, have just finished a 24-inch independent centrifugal pump, which is coupled to an 80-horse-power Westinghouse engine. It is for plantation drainage in Louisiana.

RHODE ISLAND.

The Pawtucket Mfg. Co. are adding to their facilities for building bolt and nut machinery. Among the more recent tools put in is one of the Rochester Machine Tool Works' heaviest planers of the "86" pattern. The Pawtucket Co. say that their business has shown a steady growth.

The copartnership heretofore existing under the firm name of Thurston, Stearns & Co., of Providence, has been dissolved by mutual consent, Mr. W. H. Stearns retiring to engage in another line of manufacture. The business will be continued under the name of the Thurston Mfg. Co., who will settle all accounts due and all liabilities against the late firm.

D. B. Cruickshank, of Providence, recently shipped a 15-horse-power engine and boiler to J. F. Hayes, Block Island, R. I.; a 10-horse-power upright engine to the Ashland Cotton Co., of Jewett City, Conn., and a wood planer to the Springfield Carriage Wheel Co., Springfield, Mass. Mr. Cruickshank has also just issued a new catalogue and list of machinery.

CONNECTICUT.

Smith, Winchester & Co., of South Windham, have recently shipped to Kimberly, Clark & Co., of Wisconsin, one of their paper mills, a Fourdrinier machine, weighing over 95 tons. This is probably the largest paper machine ever made in this country. Nine freight cars were required for its shipment.

The Pratt & Whitney Co., Hartford, have been running increased hours in several departments.

Owing to the increased orders the employees of the New Haven Clock Co.'s movement department began on Monday to work 13 hours per day.

Thompson & Holmes have sold their chuck works to the Cushman Chuck Works, of Hartford. The principal work in the shop now will be the making of stationary engines.

The Farrel Foundry and Machine Co., of Waterbury, have an order for a complete set of machinery for the first cartridge factory ever established in Canada. They are building three large nail machines of the Capewell pattern for export.

The watch manufacturing company located in New Haven will remove to Trenton, N. J. in the spring. As a larger capital was wanted, and Trenton people agreed to furnish the funds which could not be raised in New Haven, the change was decided on.

NEW JERSEY.

The machine shops of the Lehigh Valley Railroad, located at Phillipsburg, were damaged by fire to the extent of $10,000 last week.

NEW YORK.

The Albany and Rensselaer Iron Co., reorganized with a capital of $2,500,000 as the Troy Steel and Iron Co., are running all departments full, except steel. This department will start in about March 1, the works employing altogether 400 to 500 men.

Messrs. Westinghouse, Church, Kerr & Co., of New York, are now completing their contract for the entire steam plant of the Marvin Safe Co.'s factory in New York. The works will be occupied on March 1. The boiler is of steel, in a single sheet, and, on account of limited head room, is without a dome, having instead a dry-pipe, with a Lawson diaphragm, as a steam separator. The grates are 42 inches below the shell.

PENNSYLVANIA.

The Mahoning Natural Gas Co. have been granted a charter. The capital stock of the company is $250,000, and the principal office is to be in New Castle.

Scarcity of coke has caused No. 2 stack at Bushong's Furnace, Reading, to go out of blast. The stack was yielding 240 to 300 tons of iron a week, when, owing to the Western strike, fine coal had to be substituted for coke. The coal packed too tight and the furnace clogged and chilled. The work of cleaning it out will take several weeks. Dynamite will probably have to be used in removing the slag. The company will put No. 1 stack in blast shortly.

The Cambria Iron Co. banked down blast furnace No. 1 Wednesday, the 17th inst., owing to lack of fuel. This leaves but one of the company furnaces in Johnstown (No. 2) in blast.

Spearman Furnace, at New Castle, was banked on Monday, the 15th inst., being unable to obtain a supply of coke.

The Penn Hardware Co., of Reading, have received an order from P. Lorillard, of New Jersey, for 15,000 tobacco cutters.

The 2000 men employed in the Philadelphia and Reading Railroad Co.'s shops at Reading have been notified that an increase in wages in all departments will be made on March 1. The ratio of the proposed increase was not announced.

The employees of the Coleraine Iron Works, at Redington, have been granted an advance of 10 per cent. in their wages.

The report that the puddle mill of the Bethlehem Iron Co., which has been idle for several years, was about to resume operations does not contain "one word of truth."

The Scranton Steel Co. has started double turn.

PITTSBURGH AND VICINITY.

Mr. Herman Mechling, formerly connected with the Volta Iron Co., Limited, has accepted the vice-presidency of the Beaver Falls Iron Co.

The men employed at Charlotte Furnace, at Everson, have been granted an increase in wages.

The partnership heretofore existing between George L. Fischer, D. J. Thomas and Peter Wenzel, under the firm name and style of Fischer, Thomas & Co., proprietors of the Birmingham Foundry and Machine Works, has been dissolved, Mr. George L. Fischer having purchased the interests of Messrs. Thomas and Wenzel. Mr. Fischer will continue the business under the name of the Fischer Foundry and Machine Co.

The table glassware manufacturers in Pittsburgh are now running their factories full. The following table shows the number of furnaces in operation and the output of the same at the present time:

	Furnaces.	Daily output. Tons.
King, Son & Co	2	45
George Duncan & Sons	2	40
Brice Bros.	3	72
Adams & Co.	3	65
McKee Bros.	3	65
Ripley & Co.	2	45
Brice, Higby & Co.	2	45
Hartley & Co.	1	30
Doyle & Co	1	25
Challoner, Taylor & Co	1	35
Atterbury & Co.	1	35
Phœnix Co.	2	40
Rochester Tumbler Co.	4	80
Total	27	622

H. K. Porter & Co., of Pittsburgh, have shipped a light locomotive to Pottsville. They have also one building for the steel works at Troy, N. Y.; another to a brick-making company on the Hudson, and last week received an order for an engine, only 2-feet gauge, for a Roman Catholic community near Montreal.

The Volta Iron Co., Limited, have broken ground at Apollo for a 10-ton open-hearth furnace, and the work will be pushed rapidly to completion. The Pittsburgh Galvanizing Works of James McQuiston have been consolidated with this company and Mr. McQuiston will be the manager of the galvanizing departments of both mills.

The patent of the Giant Hydraulic Jack Co., of McKeesport, has been purchased by a syndicate of New York capitalists.

Lindsay & McCutcheon will build a hinge factory adjoining their works at Allegheny.

OHIO.

The Morse Bridge Works, at Haselton, are running full The firm have recently booked a large order from Omaha, Neb. They have the contract to build there two viaducts 1500 feet long. About April 1st this firm will have the large bridge at Minneapolis completed.

The new Co-operative Nail Works Co., Steubenville, cut their first nails on the 1st inst. The first nail cut in the new mill was purchased for $5, and the second brought $2.50. The first keg was purchased by a Steubenville merchant. The officers of the new company are B. F. Prentiss, president; W. J. Verner, vice-president, and James Marion, secretary.

The Falcon Iron and Nail Co., Niles, have secured rolls for the manufacture of pipe iron.

The Forsyth Scale Co., of Youngstown, write us that they have been running steadily without losing a day since April 1st, 1885, and have new orders that will keep them running for six months. They report an improvement in trade in their line as compared with last year, and from the present outlook expect a steady trade during the year.

ILLINOIS.

The Knowlton Mfg. Co., of Rockford, recently shipped to the Toledo Bolt and Nut Co., of Toledo, Ohio, for use in their bolt works, a Brown rubber-cushioned power hammer.

The Calumet Iron and Steel Co., Chicago, now have 65 nail machines at work, and are steadily increasing the number. The merchant bar and plate mills are in operation, as is also the open-hearth furnace, and the output in all departments is being increased. Some 400 men are now employed.

The McCormick Reaper Works, of Chicago, closed down indefinitely on Tuesday, the 16th inst., owing to a threatened strike of the operatives because of the refusal of the company to dismiss five non-union molders.

MISSOURI.

The N. O. Nelson Mfg. Co., of St. Louis, have just finished an electric lighting plant with 250 incandescent lights throughout their factory. The dynamo is of the U. S. Electric Light Co.'s make, and is driven from the factory line shaft. A 125-horse-power Atlas automatic engine drives the entire machinery, with the addition of the lighting system. The company are now running full time in every department. They have also established a branch house in Kansas City, where a full line of their machinery will be kept for sale.

The Midland Blast Furnace Co., with plant in Crawford County, will resume operations in April. They blew out on the 31st ult., after a continuous run beginning January 12, 1885. Their previous blast had been of 15 months' duration.

The suits against the American Barb Wire Co., of this city, brought by the Washburn & Moen Mfg. Co., of Worcester, Mass., for infringement of patents, have been compromised, and the American granted a license to manufacture under the Glidden patent. Besides taking out a license, the American has absorbed the Pacific Barb Wire Co., works at Twelfth and Gratiot streets; the Benton Wire Works, 314 South Twenty-first street; the Frederick Wire Co., works near the Fair Grounds; Lone Star Barb Wire Co., works at 915 North Main street, and John Coles & Co., works No. 17 South Sixth street. The machinery of all the companies named, 40 machines in all, will be removed to the works of the American Barb Co., Nos. 310 and 312 South Twenty-fifth street. The purchase includes all existing contracts. There remain now only two unlicensed companies—the Standard, operated by Crecelius Bros., and the Crescent, owned by Horace Stone and D. I. Field. Each have applied for and been refused licenses. It is altogether probable that one or both of these companies will follow in the wake of the others—be merged into the American—and thus end, for a time at least, the barb-wire war in this city.—*Midland Industrial Gazette, St. Louis.*

The St. Louis Bolt and Iron Co. are running in all departments of their works in East St. Louis. The nut factory which they erected last summer has not yet been used for the manufacture of nuts for the market, but has been employed altogether to meet the company's current and ordinary requirements for this class of goods.

CALIFORNIA.

The Hotaling Furnace will blow in soon.

DELAWARE.

The large iron foundry of Morris, Tasker & Co., at New Castle, which gave employment to 1000 hands, has been closed and is offered for sale.

WEST VIRGINIA.

The American Snow Dispersing Machine Co., capital stock $150,000, have been incorporated in this State to manufacture snow-dispersing machines. The principal office is to be at Philadelphia.

The Junction Iron Co., of Wheeling, whose factory is at Mingo, Ohio, have compromised the strike with their nailers and signed the scale on a basis of 19 cents per keg for cutting nails at present selling card of $2.50 for 10-penny, and proportionately less for larger and more for smaller sized nails, and ascending 1 cent per keg with every advance of 25 cents in selling price, and descending 1 cent with every 25 cents reduction, until the price reaches 18 cents, below which no reduction is made in wages.

NORTH CAROLINA.

The various mills of the Oliver Oil Co., in Charlotte and Columbia, S. C., are all run by Westinghouse engines, seven in all. One of 100 horse-power is now being erected in the latter mill.

TEXAS.

The Gulf, Colorado and Santa Fé Railroad are putting a 65-horse-power Westinghouse engine into their new shops at Galveston, and the Florida Railway and Navigation Co. similarly, at Fernandina, 35-horse-power; likewise the Wabash, St. Louis and Pacific, 75-horse-power, at Decatur.

ALABAMA.

The blowing in of the Edwards Furnace, near Woodstock, which has been out of blast some four years, is contemplated.

E. G. Stephens and W. B. Elliott have an application in the hands of the Birmingham City Council for franchises for a second gas company.

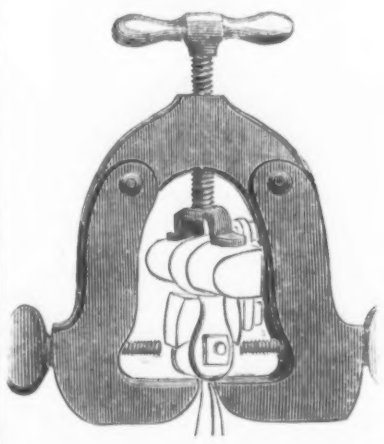
Two artesian wells, running 300 gallons of good water per minute together, have been completed at Montgomery for the Capital City Water Co.

Work is proceeding night and day on No. 1 stack at the Shelby Iron Works, which was recently blown out for relining. The new orehouse is finished and cars take the roasted ore by an elevated track and dump on both sides, thus housing and keeping dry a great quantity of the stock. Track is being laid into the ore banks to bring out by cars and rail what has before been hauled by mules and carts. The company have put in new cars on their railroad line to Columbiana, and are operating the road for general freight and passenger traffic as well as for charcoal and iron. Mr. Lyman, general sales agent for the Shelby Iron Co., of Cincinnati, reports all the iron made previous to this winter sold, but a small amount on hand. The furnaces have been running for several months past entirely on Nos. 2 to 5 car-wheel iron.

Hardware Novelties.

The Champion Rubber Clip Inserter.

W. B. Woodman & Co., 10 and 12 Ward street, Newark, N. J., are manufacturing and placing on the market the Champion Rubber Clip Inserter, a general view of which is shown in the accompanying illustration. In using this device the inserter is placed over the axle, as shown in the cut, and the two side screws brought down upon



The Champion Rubber Clip Inserter.

the shaft. The rubber is next placed in the clip and the shafts are drawn inward by turning the center screw. When the eyes of the clip are brought opposite, the bolt is inserted and the operation is competed. This device is made of malleable iron and is described as cheap and durable.

New Lock-Joint Calipers.

The annexed cuts illustrate new lock-joint calipers manufactured by L. S. Starrett, Athol, Mass., which are designed to meet the demand for a simple, cheap and reliable caliper of wide scope—one which can instantly be adjusted to its full extent, as quickly locked, and at the same time provided with a sensitive adjustment. In its construction special attention is directed to the lock and to the arrangement for fine adjustment. The long arm of these calipers has a slit at the top which extends down

Fig 1.—Lock-Joint Outside Caliper.

Fig. 2.—Lock-Joint Inside Caliper.

as far as the pivot. By closing this slit, as described below, pressure is brought to bear on the pivot and the caliper is firmly locked. The opening and closing of this slit are accomplished by a thumb-piece, of which the shank extends through the long arm of the caliper and also through two small flat pieces of steel, one on each side. The shank, where it passes through the caliper arm, is partially cut away, so as to form an eccentric. Thus by moving the thumb piece a fraction of a turn in either direction the slit is closed and the caliper set. Fine adjustments are effected by means of a thumb-screw on the short arm, which has a diagonal slit in it, as shown in the cuts. At the upper end of the split a small screw passes through the arm, and at the other side enters a nut having a milled head. The screw-head is of conical shape, so that when the milled nut is tightened the screw-head is forced into its seat, and in so doing opens the slit. This action, it will readily be seen, closes the calipers slightly, or opens them in the case of inside calipers. These calipers are made 6, 8 and 10 inch, both outside and inside.

The Gibbs Post-Hole Digger.

The illustrations given below represent a recent addition to the line of post-hole diggers which have been put on the market by the Gibbs Lawn Rake Co., Canton, Ohio, and for which a patent has within a short time been obtained. The operation of the digger will be readily apprehended by reference to the cuts, Fig. 1 representing the digger ready for inserting into the ground, while Fig. 2 shows it with the lever down, after the blade has by the action of the lever been forced across the bottom of the hole, with the loose soil ready to lift out and discharge. This discharge is accomplished by simply moving the lever back again into the position for digging. The blade is described as made of the best cast steel, the iron as

Fig. 1. Fig. 2.

Gibbs Post-Hole Digger.

being of the best malleable, and the handles as made of extra quality hickory. The manufacturers place the digger on the market with confidence in its excellence, alluding to its simplicity of construction, efficiency of operation and durability.

TRADE PUBLICATIONS.

Turbines.

Messrs. Craig Ridgway & Son, of Coatesville, Pa., have issued an elaborate catalogue devoted to the interests of their Perfection water-wheel. It embraces over 100 pages, is perfectly illustrated and supplies much information of practical value to mill owners in general. It is impossible for us to here give it more careful consideration, and we would accordingly advise those interested to secure a copy for examination.

The Empire Steam Pump.

The Empire steam pump, recently shown and described in our columns, is presented in an attractive manner in a catalogue just issued by the Empire Steam Pump Co., of 12 Cortlandt St., New York. Perspective and sectional views explaining the mechanism of the pump are given, together with the necessary descriptive particulars and tables of sizes and prices.

Hoisting Machinery.

Messrs. Otis Brothers & Co., of 92 Liberty street, New York, have just issued a new catalogue, which in attractive appearance and general excellence surpasses all other similar publications that have reached us for some time past. It measures 11 x 14 inches, embraces 46 pages of matter printed on heavy paper, and is substantially bound in a cloth cover. The engravings, of which there are a large number, showing the different forms of hoisting apparatus built by the company, and the various departments of their works, are finely executed, and are accompanied in every case by brief descriptions, special pamphlets being referred to for details. The catalogue shows not only the progress made by Messrs. Otis Bros. & Co. during a period of 34 years devoted exclusively to elevator manufacture, but affords also a glimpse of primitive forms of hoisting apparatus which have marked the progress of mankind in this particular field of mechanical art. A reference list is included, embracing many of the prominent buildings throughout the world, indicating the facilities of the Otis company for producing and maintaining a high standard of elevator service.

Railway Supplies and Machinery.

Mr. Wm. Minnigerode, of Atlanta, Ga., has issued a small pamphlet addressed particularly to buyers of railway supplies and machinery. He represents a number of prominent Southern iron works and machine firms, and supplies particulars which will no doubt prove convenient to those interested in such matters.

Shafting, Pulleys, Hangers.

Messrs Poole & Hunt, of Baltimore, Md., are sending out a new price list of shafting, pulleys and hangers. It is fully illustrated, and, in addition to particulars of trade interest, contains an engraving and a description of their works.

Exports.

The following list embraces the Exports of Hardware, Machinery, Iron, Metals, &c., from the port of New York, for the week ending February 23, 1886:

	Quan.	Val.
Danish West Indies.		
Sails, bales	2	$250
Copenhagen.		
Iron safe	1	100
Hdw., pkgs.	11	280
Mach'y, pkgs.	5	500
Ag. imp., pkge	1	25
Clocks, cs.	7	161
Rotterdam.		
Copper, cks.	72	9,080
Hamburg.		
Sew. ma., cs.	91	3,566
Copper mat., bags	2300	10,000
Copper, bars	3	40
Ag. imp., pkgs	94	4,159
Mach'y, pkgs.	4	85
Bremen.		
Hdw., pkgs.	48	2,184
Mach'y, pkge.	1	20
Ag. imp., pkgs	9	660
Mf. iron, pkgs	2	25
Sew. ma., cs.	4	80
Clocks, cs.	4	150
Pumps, pkge.	1	11
Tinware, cs.	2	150
Liverpool.		
Hdw., pkgs.	106	3,113
Ag. imp., pkgs	29	416
Stereo. plates, cs.	8	85
Sew. ma., cs.	192	5,063
Saws, cs.	12	139
Mf. iron, pkgs	15	370
Copper matte, bags	765	3,500
Ox. zinc, bbls.	50	346
Mach'y, pkgs.	101	9,394
Clocks, pkgs.	129	3,707
Metal gds., cs.	3	74
Guns, cs.	3	145
Ore, box	1	10
Wire, cks.	3	850
M. rollers	2107	500
Chains, box	1	405
Antwerp.		
Ag. imp., pkgs	49	2,065
Mf. iron, pkgs	33	191
Mach'y, pkgs.	9	130
Hdw., pkgs.	27	936
Arms, cs.	4	857
Sew. ma., cs.	84	1,300
Amsterdam.		
Clocks, cs.	10	285
Hdw., cs.	6	125
Firearms, cse	1	218
London.		
Hdw., pkgs.	81	2,126
Ag. imp. pkgs	46	3,239
Mach'y, pkgs.	2	144
Spelter, slabs	3129	9,800
Saws, case	1	110
Clocks, pkgs.	70	2,559
Sew. ma., cs.	90	2,469
Nails, pkgs.	161	3,950
Mf. iron, pkge.	1	100
Wire, bbls.	4	414
Bristol.		
Hdw., cs.	3	286
Glasgow.		
Mf. iron, pkgs	16	270
M. sheath., c. load	1	538
Ag. imps., pgs.	15	425
Hull.		
Mach'y, pkgs.	4	4,186
Sew. ma., cs.	16	255
Ag. imp., pkgs	178	17,580
Pumps	40	345
Leith.		
Ag. imp., pkgs	5	507
Hdw., cs.	30	734
British Australia.		
Hdw., pkgs.	804	14,097
Mach'y, pkgs.	25	2,741
Pumps, pkgs.	3	165
Wringers, cs.	61	903
Nails, bxs.	42	383
Wire, cs.	2	70
Barbs, cs.	10	100
S. rollers, cs.	60	1,350
Axles, cs	12	575
Clocks, pkgs.	88	1,498
Stp'd ware, cs.	7	129
Sew. ma., cs.	26	627
Wire mattresses, cs.	9	260
Rifles, cs.	13	464
Air guns, cs.	2	179
Washing ma., cs.	9	228
Wire cloth, cs	2	55
Ag. imps. pkgs	55	1,428
Mf. iron, pkgs	184	2,790
Saws, cs.	21	487
Springs, case	1	26
W. mill matl., pkgs.	11	190
Cartrid's, cs.	25	561
Revolvers, cse	1	415
British West Indies.		
Trusses, case	1	55
Cutlery, cs.	3	52
Sew. ma., cs.	5	71
Ag. imp., pkgs.	5	94
Clocks, cs.	2	108
Nails, kegs	57	160
M. dust, bbls.	10	12
Saws, cs.	4	14
Tinware, cs.	3	36
Hdw., pkgs.	49	639
Mf. iron, pkgs	37	275
Nails, cs.	10	15
Anchors	3	23
Nova Scotia.		
Graniteware, cs.	2	82
Clocks, cs.	9	110
Tin, pigs	21	475
Mf. iron, pkgs	113	152
Water-closets, pkgs.	51	133
Copper, case	1	46
Sew. ma., cs.	3	803
Gibraltar.		
Clocks, cs.	10	180
Newfoundland.		
Mf. iron, pkgs.	26	244
British Honduras.		
Tinware, cs.	2	28
Hdw., cs.	46	506
Sew. ma., cs.	32	329
Nails, kegs	35	147
Clocks, cs.	3	79
Havre.		
Sew. ma., cs.	182	5,231
Ag. imp., pkgs	180	4,236
Hdw., case	1	48
Copper, cakes	450	6,800
Pumps, pkgs.	19	1,300
Marseilles.		
Ag. imp., pkgs	98	3,014
Clocks, bxs	27	653
French West Indies.		
Sew. ma., cs.	5	150
Corunna.		
Nails, keg	1	5
Naples.		
Hdw., cs.	27	1,019
Cuba.		
Hdw., pkgs.	300	3,558
Copper tubes, cs	6	536
Locomotive	1	7,500
Wheels on a., pairs	72	1,063
Railroad bars	294	808
Nails, bxs	13	170
Pumps, pkgs.	7	134
Cutlery, cs	112	2,272
Tinware, cs.	11	484
W. cloth, pgs.	2	63
Cartridges, cse	1	30
Revolvers, cse	1	157
Mf. iron, pkgs	74	949
Mach'y, pkgs.	63	2,189
Ag. imp. pkgs	4	43
Spikes, kegs	140	334
Saws, cs.	5	369
Scales, cs.	73	1,128
Nails, kegs	413	948
Clocks, pkgs.	8	348
Tin plates, cse	1	15
Sew ma., cs.	186	1,360
Venice.		
Clocks, case	1	715
Porto Rico.		
Nails, kegs	50	121
Wire, coils	5	110
Lisbon.		
Hdw., cs.	50	400
Windmills	4	305
Palermo.		
Iron safe	1	20
Mexico.		
Mach'y, pkgs.	55	2,720
Tinfoil, cs.	2	66
Per. caps, cs.	3	173
Hdw., cs.	61	959
Ammunition, pkgs	4	50
Pumps, pkgs.	5	137
Scales, case	1	18
H'p iron, pkgs	2	49
Shot, kegs	4	39
Clocks, case	1	30
Tin plate, cs.	10	53
Nails, kegs	60	143
Nails, cs.	6	82
Tinware, case	1	10
Mf. iron, pgs.	365	1,428
Sew. ma., cs.	66	4,685
Firearms, cs.	2	315
Ag. imp., pkgs.	7	98
Car springs, cs	4	81
Tacks, cs.	2	17
Cutlery, cs.	3	37
Brazil.		
Mf. iron, pkgs	122	878
Bridge mat'l, pkgs	336	4,905
Ptg. mat., cs.	22	1,336
Hdw., cs.	610	7,020
Pumps, bxs	28	966
Tacks, cs.	14	261
Nails, kegs	272	650
Pistols, cs.	2	90
Steel tires	12	480
Steel springs	24	111
Clocks, cs.	53	1,331
Cutlery, cs.	147	2,104
Locomotives	2	12,000
Mach'y, pkgs.	58	5,380
Granite ware, cs.	22	1,305
Car wheels	400	2,185
Ag. imp., pkgs	39	789
Sew. ma., cs.	101	1,644
Tin plate, cs.	4	50
Rifles, cs.	3	219
Nails, pkgs.	42	120
Scales, cs.	14	115
Cartridges, cs	3	71
Saw	1	51
Leghorn.		
Pumps, pkgs.	9	208
Oporto.		
Clocks, cs.	22	381
Genoa.		
Mach'y, pkgs.	10	470
Ag. imp., pkgs.	5	150
Clocks, cs.	19	147
Pumps, pkgs.	10	578
Hdw., cs	2	14
San Domingo.		
Yellow metal, case	1	58
Nails, kegs	2	28
Mach'y, pkgs.	77	214
Copper, case	1	40
Mf. iron, pkgs	38	145
United States of Colombia.		
Hdw., pkgs.	238	4,583
Mach'y, pkgs.	236	7,588
Brass goods, cs.	4	253
Tin plate, bxs.	12	62
Clocks, cs.	13	344
Bells, cs.	3	70
W. mill, matl., pkgs	21	906
Firearms, cs.	6	750
L'd pipe, pgs.	4	46
Shot, bags	50	45
Ag. imp., pkgs.	15	276
Nails, cs.	32	338
Iron, pkgs	25	158
Iron vestibule	1	600
Cutlery, cs.	148	2,066
Sew. ma., pgs.	235	4,194
Tacks, case	1	19
Cartridges, cs	239	3,783
Steel, bdls.	83	756
Scales, cs.	19	321
Solder, case	1	15
Tinware, pkgs	31	784
Iron safes	3	210
Saws, cs.	4	61
Pumps, pkgs.	9	117
Plumbago, lb.	827	50
Nails, kegs	35	245
Iron, pkgs	539	778
Plumb. matl., pkgs	6	88
Wat. closets, pkgs.	4	68
Yel. met., case	1	59
Rivets, cs.	32	257
Guns, case	1	101
Venezuela.		
Cutlery, cs	46	153
Tinware, cs.	9	185
Sew. ma., cs.	27	501
Central America.		
Nails, kegs	28	167
Hdw., cs.	60	708
Mf. iron, pkgs.	267	1,540
Tinware, cs.	11	163
Gun caps, cs.	2	55
Scales, cs.	4	31
Revolvers, cse	1	24
Steel, pkgs.	4	16
Brass goods, case	1	100
Guns, case	1	42
Y. met. sheathing, bbls.	3	134
Cartridges, cs	2	53
Scales, cs.	10	140
Cutlery, cs.	16	452
Mach'y, pkgs.	25	464
Rivets, cs.	4	51
Shot, bxs	7	72
Sew. ma., cs.	15	336
Zinc, cask	1	37
Uruguay.		
Scales, cs.	25	95
Irons, cs.	40	860
Hdw., pkgs.	90	1,534
Tinware, cs.	2	10
Cutlery, cs.	33	608
Ag. imp., pkgs.	61	1,428
Clocks, cs.	10	380
Argentine Republic.		
Mf. iron, pkgs	13	472
Sew. ma., cs.	161	2,995
H'p iron, bdls	138	264
Clocks, cs.	97	2,196
Saws, case	1	10
Hdw., cs.	362	4,550
Ag. imp., pkgs	157	3,052
Mach'y, pkgs.	21	1,475
Japan.		
Locks, case	1	36

Louisville.

W. B. Belknap & Co., Louisville, write as follows, under date of February 22: Trade reports for the past two months have necessarily savored more of the meteorological than of the commercial, inasmuch as the continued cold and snow affect trade so keenly. We believe that there has been hardly a single post-hole dug or a brick laid in our State since the year began, and on the river bottoms people are living in the apprehension of floods until the month of February is over. The ice blockade in the Ohio River has been raised, and now the boats are running regularly. A large run of Coal, 5,000,000 bushels, has started from Pittsburgh for the lower river ports. The large accumulation is due, we take it, to the substitution of natural gas for Coal at Pittsburgh, so that, while the manufacturers of Pittsburgh have been obtaining a cheap natural fuel, the effects of this change will be felt all along the line by a reduction in the price of Coal. Pittsburgh Coal declined here 50¢ ℔ ton in a single day, and it is now selling at $2.50, delivered in small lots. This in turn reacts on Kentucky Coal, of which the best grades of Lump are selling at $2 ℔ ton, and possibly less in round lots.

Bar Iron—Holds its own in the way of prices, although no very large quantities are being inquired for.

Sheet—On the contrary, is as cheap as we have ever known it for the lighter gauges since the depression of 1879. Basing their hopes on the improvement in other lines, the Sheet manufacturers predict better figures for spring delivery. Improvements of a decided character have been made of late years in the way of annealing, so that what is sold for the ordinary B. Sheet now in many cases will stand the tests which it was formerly supposed belonged to Charcoal and the higher grades.

Nails.—Are arriving only in small quantities. There would be a great scarcity were it not that the demand for consumption has been exceptionally light. Before the settled weather comes, however, many predict that there will be concessions made on one side or another and the strike be brought to a settlement. However this may be, there have been no startling advances made in the prices, so there will be no great distance to recede.

Wire.—The Wire market is quite firm, and the manufacturers of Barbed Fencing have gained courage from the fact that several of the St. Louis moonshine concerns have taken out license. We are promised big things for March in the way of sales and prices, too. In the meanwhile, however, stocks are ample for our present requirements.

General trade is in pretty good shape, although disappointing to those who expected extraordinary features.

George H. Hull & Co., of Louisville, report to us as follows, under date of February 22: The market for two weeks has been in a very uncertain condition. Very few furnaces would book orders, and there was little demand from buyers. If furnaces commenced to offer Iron before buyers were ready to take it, it might depreciate prices. If buyers commenced to inquire before furnaces were ready to deliver, prices might stiffen. There is some inquiry now from buyers, and the market is looking stronger than it did a week ago. We quote for cash as below:

PIG IRON.

Southern Coke, No. 1 Foundry	$18.00 @ $18.50
" No. 2 "	17.00 @ 17.50
" No. 2½ "	16.50 @ 17.00
Hanging Rock Coke, No. 1 Foundry	18.00 @ 18.50
Hanging Rock Charcoal, No. 1 Foundry	20.00 @ 21.00
Southern Charcoal, No. 1 Foundry	18.00 @ 19.00
Silver Gray, different grades	16.50 @ 17.50
Southern Coke, No. 1 Mill, Neutral	16.00 @ 16.50
" " No. 2 " "	15.00 @ 15.50
" " No. 1 " Cold Short	15.50 @ 16.00
" Charcoal, No. 1 Mill	17.50 @ 18.00
White and Mottled, different grades	13.00 @ 14.50
Southern Car-Wheel, standard brands	25.00 @ 26.00
Southern Car-Wheel, other brands	21.00 @ 22.00
Hanging Rock, Cold-Blast	27.00 @ 28.00
" " Warm-Blast	21.00 @ 22.00

Old Material.—The market for Old Material is quiet, but firm. There is still considerable difference between the views of buyers and sellers on large lots, and large transactions are consequently refused. We quote for cash as below:

Rails, ℔ ton	$20.50 @ $22.00
Wheels, ℔ ton	14.00 @ 15.00
No. 1 Wrought, ℔ 100	.80 @ .90
No. 1 Country Wrought, ℔ 100	.70 @ .75
No. 2 Country Wrought, ℔ 100	.50 @ .60
No. 1 Cast, ℔ 100	.40 @ .50
Boilers, cut, ℔ 100	.60 @ .65
Boilers, uncut, ℔ 100	.40 @ .45
Flues, Tanks and Sheets, ℔ 100	.20 @ .25
Burned Scrap and Sheets, ℔ 100	.20 @ .30
Axles, ℔ 100 ℔	.90 @ .95

Baltimore.

W. N. Wyeth, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of February 23: Since our last report trade has continued ruling much the same as then stated—that is, largely improved as compared with the latter months of the past year. The volume of business doing at this time is on the whole satisfactory, considering the severity of the weather for the past month, which acts directly on the country trade, and with the coming spring months trade will undoubtedly largely improve, both as regard volume and value. We quote the list unchanged and firm as per annexed figures:

Ref. Bar Iron, 1 to 6 x ⅝ to 1	℔ ℔ 1.85 @ 2.10¢
" " 1 to 4½ x 1½ to 1	℔ ℔ 1.85 @ 2.10¢
" " ¾ to 2, Round and Square	℔ ℔ 1.85 @ 2.10 ¢
Hoop Iron, 1½ wide and upward	℔ ℔ 2½ @ 3¼ ¢
Band Iron, from 1½ to 6 in. wide	" 2.30 @ 2½ ¢
Horse Shoe Iron	" 2¾ @ 3 ¢
Norway Nail Rods	" 5 @ 5¼ ¢
Black Diamond Cast Steel	" 9 @ 10 ¢
Machinery Steel	" 3½ @ 4¼ ¢
Spring Steel	" 3¾ @ 4 ¢
Common Horse Nails	" 8 @ 9 ¢
Railroad Spikes, 5½ x 9-16	" 2.30 @ 2½ ¢
Perkins's Horse Shoes, ℔ keg of 100 ℔	$3.70
" Mule Shoes	4.70
Boiler Tubes	55 ℅ off list.

S. H. Byrne of Brighouse, England has patented an apparatus for drawing wire. The dies employed in the apparatus consist of bolus or pea bort perforated and set concentrically in a metal disk, and this is inserted into a holder which is provided with a hollow axis through which the wire passes. The holder has spur teeth upon its periphery, which engage with corresponding teeth upon a pinion on an axis which is slowly rotated to impart a continuous rotary motion to the dies. Bolus or pea bort is a form of carbon found in the beds which also yield diamonds. The shape it takes is that of pea-like balls, either clear or more or less colored. It will not cleave like the diamond in paralle planes, but its structure is radial. It is said to be both tougher and harder than diamond. The invention may be applied for drawing wire of iron and steel, and also of copper and brass, and is more particularly adapted for drawing fine wire.

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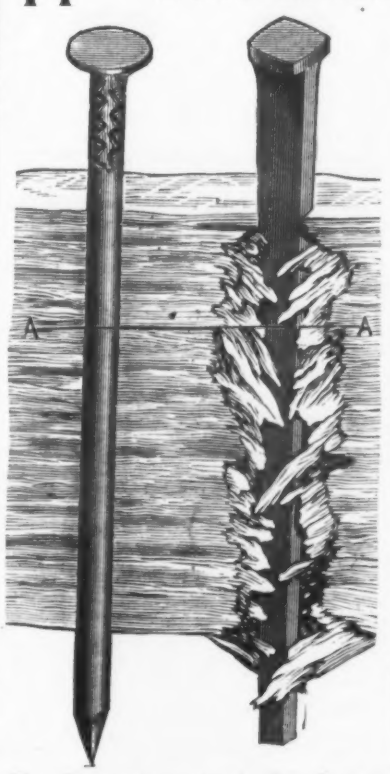
Tire Upsetter,
The Best and Cheapest.
Send for Circular, price lists and discount.
LITTLE GIANT MFG. CO.,
Millport, N. Y.

THE
Salem Wire Nail Co.,
SALEM, OHIO,
MANUFACTURERS OF
WIRE and WIRE NAILS.



The above cut represents the effect on wood of a Cut Nail and a round, pointed Steel Wire Nail.
The Steel Wire Nail is just as cheap as the Cut Nail, and far preferable to use.
Write for Price List and Discounts.

NOTICE.
The Salem Wire Nail Co. will be ready to book orders for prompt delivery on December 15, 1885. Correspondence solicited.

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From a Half-inch Snowfall.
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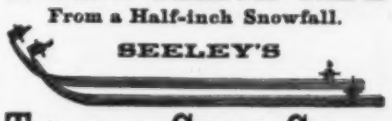

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Practical principles of centuries ago adapted to the pleasure and convenience of the present day, entirely overcoming the annoyance and dangers from *grinding, sticking, straining and bumping* when meeting with bare spots, stone, street car or railroad crossings, streaked or slushy sleighing. Antifriction, being made from seasoned rock-maple, (oil-soaked,) conforming to the sleigh runners; recessed or grooved upon upper face, into which the sleigh is quickly and conveniently secured by metallic side clips with crossbar set-screws. Their advantages for pleasure driving in cities are equally adapted for *practical* country use. Conveniently adjusted or detached. Price, $5.00. Supplied by all leading carriage and carriage supply dealers.
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THE TOBOGGAN SLEIGH SHOE CO.
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CHILLED BEARING ANTI-FRICTION.
The BEARINGS of the Axle and Shell are both chilled or hardened steel. Being put together with one bolt, this can be taken out, the shell opened so the ROPE can be put over the wheel when needed. This pulley can be oiled very easy and will outlast any Pulley on the market. Pins for the wheel to run on not chilled or steel will not wear like these. THE PULLEY STAND can be used with any pulley and keeps the pulley in place when needed.
5-in. pulleys, packed in boxes, 4 doz.; bbls. 9 doz.
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Pulley stands as required. Send for prices.
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EUREKA
CLOTHES DRYER
FOR THE
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10 Arms; 29 Inches Long.
Of white ash, finished in oil, set in bright japanned castings.
Price, Each, $1.00.
One dozen in crates. Weight 68 pounds.
Discount to Trade 40 and 10 ℅.
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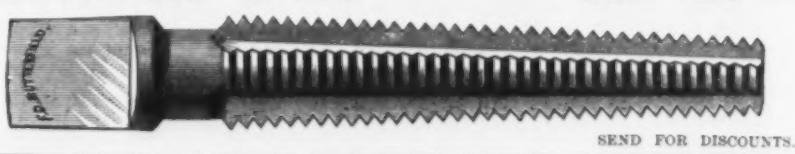

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HUGUNIN Improved Adjustable SASH BALANCES, Mechanical Substitute for Weights, 3 Sizes.
Sashes work as with weights. No clock springs to rust out or set. No latches or attachments to the Sash. No. 1, 1⅝ in. wide, $1.06 per set 4; No. 2, 1¾ do., 85c., do.; No. 3, 1⅞ do., 66c., do. Gray iron, screws included. Malleable, No. 1, $1.25; No. 2, $1.00; No. 3, 80c., per set 4. *Robt. B. Hugunin, Patentee and Solely Authorized Maker*, is cast on the face-plate of genuine improved goods. The *unimproved* No. 2's have been fraudulently copied, with date of my minor patent, Nov. 6, 1877—*never used on the genuine*. I still sell this (*unimproved*) style at half price. The *improved are made* under the care of the inventor and are warranted to give satisfaction. Sample sets mailed on receipt of list price only. Goods delivered in New York free. Address orders, &c., to No agent in New York.
ROBT. B. HUGUNIN, Hartford, Conn., U. S. A.

HEINZ & MUNSCHAUER, Buffalo, N. Y.,
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MANUFACTURERS OF
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Assorted Case Cages.
REFRIGERATORS,
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White Mountain Freezers, Tea Trays, Kettles
—AND—
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MECHANICAL.

Parallel Shaft Rotary Engines.

Not very many rotary engines, says the London *Engineer*, in one of its series of articles on rotary engines, have been based upon a consideration of the mechanism employed to couple up two parallel shafts. The one taken for examination is a very ingenious specimen, and one which has obtained a good reputation. The Parson's engine is similar in some respects to the common direct-acting engine, containing crank-shaft and cylinder, but its mechanism so arranged as to dispense with the connecting-rod. For this piece is substituted a frame which contains the cylinders and capable of revolving on suitable bearings. When two wheels connect parallel shafts, one wheel placed inside the other and of one-half its diameter, an important geometrical fact exists which renders it possible to pair reciprocating pieces in the construction, and so fulfill one of the conditions of producing rotation by fluid pressure. This property is the familiar one that every point in the circumference of the small circle moves along a diameter of the larger one, thus describing straight lines relatively to the larger wheel and lines which pass through its center. In Fig. 1, if the circle A with center *a* turns inside the large circle C with center *b*, the diameter of C being double that of A, such a point as at *b* in the circumference of A will move along a diameter of C the selected point *b* in the diameter Y Z.

This is embodied as shown in Fig. 2; a crank is formed from the axis of the inner circle and revolves about *a*; a large frame revolves about the center *b*, both being steadied in suitable bearings. The frame and the crank are connected to each other by an intermediate piece, B, which has a piston at each end and pairs with cylinders placed radially and opposite in the large frame C, and securely fixed to it; the center of the rod connecting these pistons pairs with the crank-pin of A. The effect of putting this mechanism in motion is to revolve both the frame and the shaft, the pistons sliding backward and forward in their respective chambers. That these pistons slide fairly in and out is a consequence of the before-mentioned geometrical property. They are evidently guided in a diameter of the frame, and in that particular diameter in which the crank-pin of A moves. The positions of the parts of this mechanism that they take up when the crank has moved through a series of angles of 45° are shown in the dotted outlines of Fig. 1. It will be observed that the shaft A is turned through a complete revolution, while the cylinder frame has turned through only one-half a revolution. A complete revolution of the frame is accompanied by two revolutions of the shaft.

Using this mechanism as a fluid-pressure engine, there have to be provided channels for admitting the fluid to expand the chambers at the proper time and for escaping upon the chambers contracting. We shall show presently that this is carried out by a very ingenious and valuable device. If only one pair of these single-acting cylinders be used, dead points will occur when the pistons are at the end of their travel. To prevent the engine being affected by this, and to concentrate more power in the space, a second pair of cylinders is introduced, similarly constructed to the others, but perpendicular to them. The particular point of the shaft-piece A which will move along this new diameter will be the end of a crank-pin situated in a crank equal in length to the other, but quite opposite, so that the two are in line with each other. The construction adopted and a more proportionate size of cylinders are shown in Fig. 2; the lettering will sufficiently identify the parts. A longitudinal section, Fig. 3, of the engine is attached, showing all the essential parts. The center of the cylinder frame C is hollow, and mounted on trunnions in rigid communication with the fixed frame D. The shaft A rests in bearings passing through the trunnions, which are also fixed to the frame D. Two cylinders are shown to the right in their vertical position, the piston piece B connecting the cylinder up with one crank-arm of A. The second pair of cylinders and its gear are placed alongside the others, and secured up to a second crank-arm which is immediately opposite the other. The sketches will show the general character of the detail arrangements.

For the purpose of regulating the steam, cylinder ports are formed in the cylinder frame, running from the outer end of each cylinder, and appearing in a flat surface at the side of the frame shown in Fig. 3. A large circular valve, V, is fitted in such a way that when its center coincides with the center of the cylinder piece it completely covers the four ports, but if moved a little eccentrically something of the cylinder ports is outside the valve and something inside. This valve is so covered in that its outer periphery is always in contact with boiler steam, and its inner periphery with exhaust. In Fig. 3 is shown the section of a circular piece, W, secured against the revolving frame, and amply overlapping the back of the valve to insure steam-tightness. The space between this and the valve is filled with steam, which passes through channels situated in the cylinder frame between the cylinder ports, led by a pipe from the hollow space S about the trunnions. Steam rises into this space by passing through the hollow of the trunnions and through holes constructed as shown. The steam-pipe from the boiler is fitted over the hole in the trunnions. For exhaust the body of the valve is made hollow and opens out into the atmosphere, or generally into a tank or chamber, D, inclosing the whole engine. An exhaust-pipe, E, carries the steam from the tank into the atmosphere.

The slide-valve is attached to a piece jointed at a fulcrum, F, Fig. 3. It is placed under control from the outside of the casing by means of the small wheel. The turning of this wheel, acting through proper connecting pieces, causes the valve to heel a little to the right or left. When the valve is placed over eccentrically to the cylinder frame, the ports of the cylinders passing alternately beyond the outer periphery and into the interior receive steam and discharge steam as required to produce the movements of the pistons at the proper time. By varying the amount of eccentricity the cut-off is correspondingly varied, the usual range in the larger engines being from one-eighth to seven-eighths. An excellent virtue of this eccentric-valve is that it is quite easy to reverse the engine without requiring any additional fittings. By turning the wheel so as to give it eccentricity in the opposite direction the effect is such as to reverse the disposition of the steam and move the engine the other way. The valve is not rigidly fixed to the rocking eccentric frame, but is capable of turning inside it, the frame forming a strap about the hollow boss of the valve, as shown in Fig. 3. The object of this is to cause the valve and cylinder surfaces to wear fair.

Besides the pistons of the main mechanism, which are easy to construct steam-tight, the principal joints to be considered in this respect are those to make the valve tight in the steam chamber, and those in the constuction necessary to conduct steam from the fixed trunnions into the moving gear. Provision is made for the valve by introducing a balance ring at its back, which is kept in rubbing contact with the inclosing piece by the pressure of steam. Steam is prevented from escaping from the inclosure about the fixed trunnions into the outside tank by means of the pressure of a kind of spring buffer attached to the end of the revolving frame against the fixed frame. A very complete system of lubrication is adopted. Channels or oilways are constructed through the body of the machine, leading to the principal rubbing surfaces; a force pump worked by the engine itself draws the oil from the base of the tank and sends it through all the channels well into the joints. The oil, when it has circulated through the gear, passes out with the exhaust steam and falls again into the bottom of the tank. A special device is used to prevent the water of condensation, which will fall with the oil into the tank, from collecting and being drawn by the lubricating pump.

One great feature in this engine is the reduction of the number of strokes of the piston as compared with the revolutions of the shaft. As before pointed out, one half-turn of the revolving cylinder frame—that is, one stroke of the piston—produces a complete turn of the shaft; in ordinary reciprocating engines two strokes would, of course, occur per revolution of the shaft. For engines running at high speeds this is an unquestionable advantage. The parts being also well balanced, so far as regards the weights of the pieces, the engine when running runs very smoothly and makes very little noise. For a high-speed engine this has a fair reputation for economy, a consequence of adopting a certain amount of expansion. Since its introduction other high-speed engines have been carefully treated in their valve gear for the purpose of employing steam expansively, and as a consequence it is being hard pressed in this direction by its rivals. The smaller sizes attain a very high speed, those with 3¼-inch cylinders and 3-inch stroke making 1500 revolutions per minute. A very neat and effective mode of connecting up revolving parallel shafts that are a little out of line is the Oldham coupling, and it is surprising that this arrangement has not fathered rotary engines to the same extent as has the Hooke joint. The connection is peculiarly favorable to efficient jointing, the intermediate block having a rectilinear reciprocation, and therefore capable of being embodied by an ordinary cylinder and piston. It is also to be recommended because the two shafts move with equal angular velocities, a feature not possessed by the two shafts in the Hooke joint.

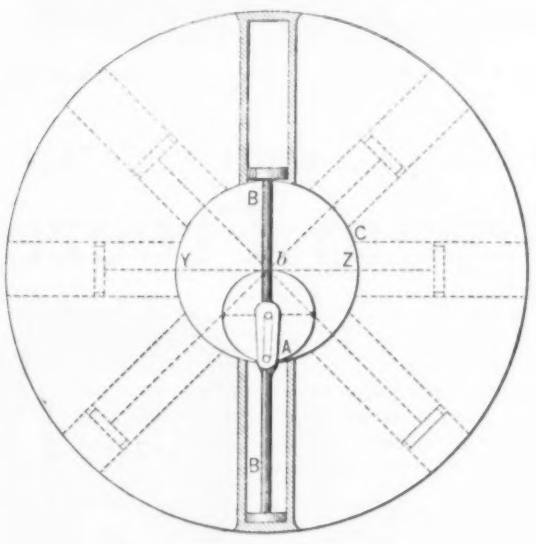

Fig. 1.—Diagram of Motions.

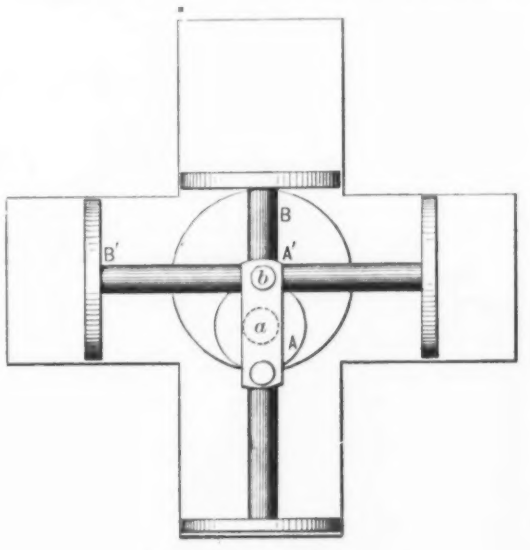

Fig. 2.—Plan of Engine.

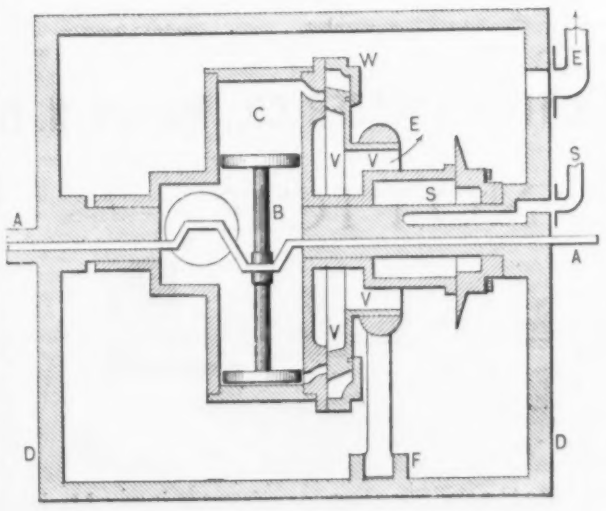

Fig. 3.—Longitudinal Section.

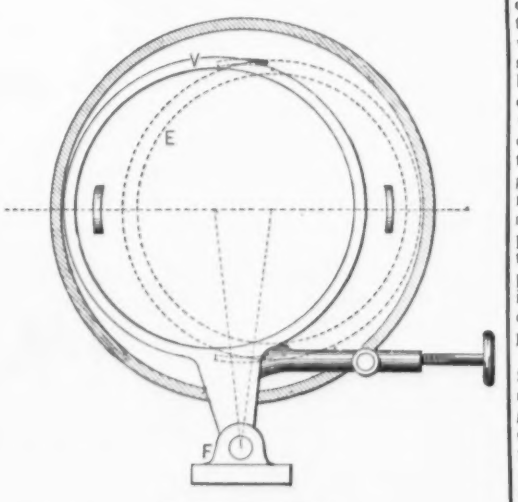

Fig. 4.—End View.

PARALLEL SHAFT ROTARY ENGINES.

Origin of the Belt and Pulley.

Mr. J. Howard Cromwell, speaking of belts and pulleys, in his recently issued book on that subject, says that the origin, age, first application and use of what is known to us as the "endless belt and pulley" are entirely unknown. As far back into the history of the ancients as we can see by means of the earliest mechanical records, we find the endless belt running continuously around the pulley, precisely as it does to-day.

We may theorize and assume a probable origin, we may bring up in support of our assumption all the reason and logical conclusions at man's disposal we may even convince mankind that we have correctly traced and explained the path over which the mechanism has come down to us from the dim ages of the past, but here we must stop; we can go no further; and the fact will yet remain that the real age and origin for which we are searching are still undiscovered and unknown. If, however, we cannot know with certainty the real age and origin of belts and pulleys, it is nevertheless a satisfaction to us to be able to trace out, by analogy, by reason and by the known existence of things which must have necessitated the use of pulleys, what seems to us to have been the origin, the successive modifications and the line of improvement by which this most useful contrivance has been handed down to us.

In searching for an uncertain origin or beginning of anything we most naturally start by determining upon the very simplest and most rudimentary form (knowing that simplicity almost always precedes complexity, and that a thing must of necessity have a skeleton before it can have a form), and then strive to fix upon its exodus from the conception to the tangible thing itself. In order, then, to trace the growth of the thing in question from its origin to its present much altered and improved form, we strive to imagine the slightest possible change in the right direction which can be given to the original. Having successfully achieved the first transformation or alteration, we continue to pick out each slight alteration and improvement in proper order until we have reached the present most improved form.

If we assume, as is claimed by some writers, that the mechanism of the belt and pulley was among the first mechanical contrivances of primitive man, we must search for its origin among what we judge to be the first necessities of the human race and the modes of obtaining these necessities. Although many claim that the human race, in the beginning, passed through a fireless period—that men lived without the use of fire or artificial heat—we must, nevertheless, conclude that this element was one of the first necessities of human life, and that the first effort made by prehistoric man in the line of invention was for the purpose of producing fire. It is very generally admitted that the first "fire machine" (Reuleaux concludes that this was the first machine of any description—see Kenedey's English translation, "Kinematics of Machinery," London, 1876, page 204) consisted of an upright piece of wood, having one end pointed. This, fitted into a hollow in another piece of wood and being twirled rapidly backward and forward with the hands, generated sufficient heat to set fire to some small fragments of dry wood or other combustible materal. Here we have the first belt and pulley, hardly recognizable, it is true, but none the less the probable origin. The upright piece of wood here constitutes the pulley, and the human hands the belt. The first transformation seems to have been the substitution of a cord wound several times around the upright piece, in place of the direct application of the hands.

This rude contrivance, though it produced only an oscillating motion, was used for other purposes than that of producing fire. The primitive drill, lathe, potter's wheel, &c., were driven to and fro in this manner, the work being done only on the forward turn, and the backward turn serving only to place the work in such a position that the operation of cutting could be again continued. The change from this contrivance to the rope and pulley used for drawing water from deep wells, and for lifting the vast blocks of stone, columns, &c., used by the ancients in building, was slight, and may reasonably have taken place not long after the first introduction of the improved form of "fire machine." For how long a period this oscillating motion sufficed for the rough manufacturing purposes of the age, or at just what era in the life of man the change was made to the endless belt which transformed the oscillating into a continuous rotary motion, is a mystery. Whole generations, even centuries, may have been needed to impress upon the primitive mind the advantages of continuous rotation, and to accomplish the necessary change in the mechanism. It seems most probable that the loss of time incurred by useless backward motion in lathes, drills, &c., and the natural desire on the part of these ancient artisans to accomplish more and more work in less and less time, must have led to the adoption of the two pulleys and the endless belt. Gradually, very gradually, the slight but all-important change was made. Some early thinker now, unknown even in the uncertain histories of the past ages, connected the loose and separated ends of the single cord, passed the now endless cord over two cylindrical sticks, fitted roughly into a frame to hold them apart, and caused both to rotate by turning one with a crank. Next some primitive inventor obtained the friction necessary for the transmission of considerable forces by winding the cord several times around each pulley; and so in process of time, in his attempts to obtain and transmit greater powers, the man of the ages long since forgotten at last discarded the round cord for the broad flat band or belt of the present era. Reuleaux says "the crossed belt appears to be the older;" but to us it seems most probable that the flat band was first used in its simplest form—*i. e.* open—and that the crossed belt was afterward introduced in order to prevent (by its additional embracing of the pulleys) slipping, and to produce a rotation of the driven pulley in a direction contrary to that of the driver. As to the material of primitive cord and belt, we can prove nothing. It is, however, reasonable to suppose, since the skin of wild animals was the easiest material to obtain, and since from the earliest records of history skins have been used for clothing, bow-strings, &c., that the material of the primitive belt differed from the leather of to-day only in that it was untanned and unfinished, and perhaps taken from a different animal.

Doubtless the fixing together or lacing of the ends of belts was the source of considerable difficulty to the ancients, for, in all cases where such a belt could be made to perform the necessary work, round cords tied together at the ends seem to have been used. It is supposed, and very reasonably, from certain known circumstances that the first idea of continuous rotary motion which was developed in the mind of man took the form of an undershot water-wheel, driven by the current of a stream or river. The Chinese have doubtless used these water-wheels, for purposes of irrigation and drawing water, for many centuries, and, according to tradition, they were also used at an early date in ancient Assyria, Mesopotamia and other countries of Asia Minor. These pristine water-wheels consisted of a rough axle and two or more long blades, usually built up of sticks and bamboo, sometimes with rough buckets formed out of mud or clay. It is not at all unlikely that the first attempts to construct large pulleys were founded upon the principles of construction seen in the water-wheels, and that the pulleys were used without rims. From the fact that wagon-wheels with entire rims and felloes are known to have been in existence in the earliest Greek and Egyptian times, we may very fairly conclude that the use of the complete wooden, if not also iron, pulley reaches far back into antiquity, and that its advent into the world probably took place not long after the discovery of the endless belt. History informs us that the ancient city of Nineveh was surrounded by a massive stone wall over 100 feet high, and that the city was fortified with 1500 towers, each 200 feet in hight. Babylon, "the noblest city ever built by man," had a fortified wall which reached to the incredible hight of 360 feet, and her famous hanging gardens were built of "flat stones of amazing size." The Tower of Babel is said to have been "40 rods square at the bottom, and upward of 600 feet high." These gigantic structures—supposed to have been built about the year 2200 B. C.—could not have been erected without the aid of strong ropes and pulleys or similar contrivance. Thus for over 4000 years have been known and used successfully the cord and pulley which we use to-day. For how many centuries in the unknown ages of the prehistoric period men toiled and labored with their crude "fire machines," perhaps even lived and died without reaching that much of "the machine," we must leave for future investigation and developments to decide.

Slide-Valve Practice.

In a paper read before an English engineering society a short time ago Mr. T. Westgarth, speaking of the general subject of modern practice in slide-valves, directed attention to the important function of engine-valves in the question of economical development of power. Speaking of rotary-valves, he remarked that they almost invariably require to be worked by more or less complicated gearing, having a large number of working parts, all of which require attention and adjustment, and which, if not properly adjusted and attented to, very soon affect the efficient working of the valve. The rotary-valves are also objectionable, because they are not understood by the ordinary class of workmen who have to do with the working and repairing of steam engines in actual practice; and, again, these valves, with their gearing, are almost invariably more expensive than slide-valves, and it does not appear that the extra cost and complication are warranted by any material economy either of fuel or in working expense. When we come to consider the ordinary slide-valve, as compared with other valves, we at once find that we have a valve which is cheap in first cost, easily adjusted and repaired, and one with which almost every enginemen and engine-fitter is thoroughly conversant, and, moreover, one which has given and does give the most satisfactory results; the proof of which being that, although it was among the earliest arrangements adopted in connection with the steam engine, and has no end of competitors, it is still by far the most extensively used both by land and marine engineers. Of course, to give satisfactory results, the slide-valve must be properly constructed and maintained, and must also be properly set. With regard to the construction of the slide-valve, the most common practice is to make the valve of hard cast iron, working upon the cast-iron face of the cylinder, the two surfaces being properly planed and surfaced.

If the metal of which the valve and slide face are made is of reasonably good quality and kept fairly lubricated the two will work generally for years without requiring any other attention. Different metals have been tried of which to make the slide-valves, but, although some locomotive engineers are still using gun metal, the use of cast iron may be considered as almost universal. It is a common practice in large engines, and especially marine engines, to make a separate or false face for the cylinder face, which is secured to the ports by recessed headed screws, the object of this arrangement being to get a face of harder metal than can be used with wisdom in the casting of the cylinder itself. These faces have been made of gun metal, phosphor bronze, &c., but are generally made of cast iron, which seems to be the most suitable material for the purpose. Concerning the maintenance of the slide-valve, if properly constructed it requires very little attention; but the slide-valves of all steam engines should be periodically examined to see that the faces are not cutting and that the valve is properly secured to its rod or spindle.

The next consideration, namely, the setting the slide-valve, is of even greater importance. It appears to be very difficult to get an ordinary steam user to understand that his coal bill can be affected even to a small extent by the way in which steam is admitted into the cylinder of his engine and allowed to escape. Perhaps the best way we can consider this part of the subject will be to follow in fancy the operations of the slide-valve of a steam engine during one revolution. The starting point is the lead—that is, the amount which the valve opens before the piston reaches the end of its stroke. As a general rule it will be found advantageous to allow the valve to be opened from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch at the end of the cylinder remote from the crank, and from $\frac{1}{4}$ inch to $\frac{3}{8}$ inch at the end nearest the crank, when the piston is at the end of its stroke. The steam so admitted checks the momentum of the moving parts, and, what is perhaps equally important, it is an advantage to have the valve open as wide as possible during the early part of the piston travel, so that there may be free admission of steam without wire-drawing and loss of pressure. Then comes the full opening of the valve, followed by the cut-off. If an economical result is to be obtained the point of cut-off must be early, and should be so arranged that with a working pressure of 80 to 90 pounds the steam is expanded into six or seven volumes, or with a working pressure of about 150 pounds the expansion should be about 14 volumes.

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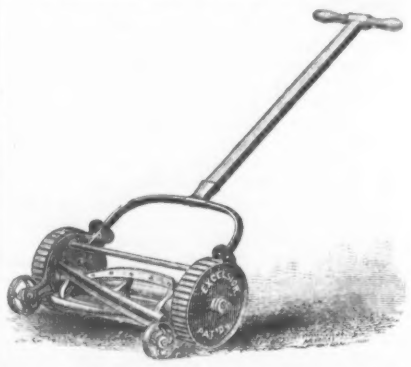

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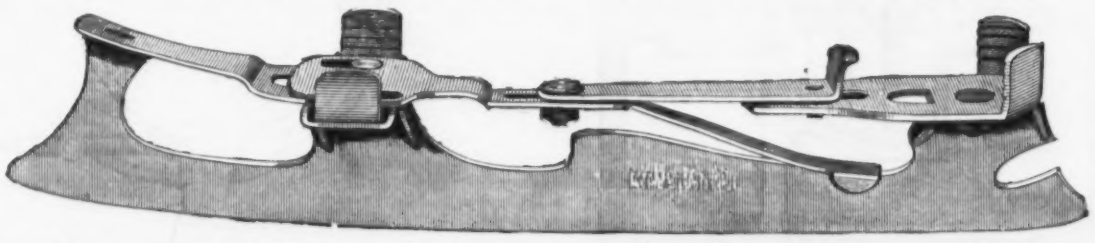

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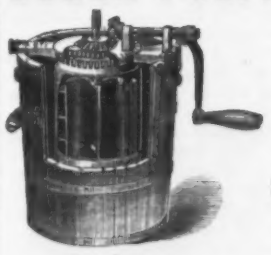

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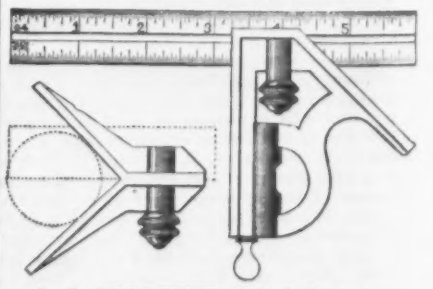

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stea n and that it should close quickly. These conditions make it necessary, when early cut-off is required, that the valve should have a long travel, otherwise it will open slowly and not very wide, the result being that the full boiler pressure will not be even approximately attained in the cylinder, and that the steam will be wire-drawn—that is, that the pressure will not be maintained even at the point reached at the early part of the stroke. Imperfect work of the slide-valve at this part of its stroke is the cause of immense loss to steam users, which is more to be regretted, as the fault could often be remedied—or, at any rate, much mitigated—with very small trouble and expense. If, as in this case of a single cylinder engine, it is desired to obtain the full benefits of using high-pressure steam, and the engine is large enough to do its work with an early cut-off—without which an economical result cannot be obtained—it is necessary to supplement the slide-valve with an expansion-valve, because if the ordinary slide-valve were set off at, say one-seventh of the stroke it would be found to be difficult to properly control the exhaust. If, however, the steam is to be expanded in more than one cylinder, as in the case of a compound engine, it will generally be found that a satisfactory result can be obtained without an expansion valve. Closing of the exhaust also requires careful attention. If it takes place too early, the engine is pulled up by excessive compression; if, on the other hand, you do not arrange to have a fair amount of compression, the admission of steam into the cylinder when the steam-valve opens will cause sudden shocks and unsatisfactory working. The only way to ascertain satisfactorily whether the slide is properly set is by the use of the indicator; and it would be an immense advantage to steam users if they would have their engines properly indicated at regular and not too long intervals.

Worthington Pumping Engines.

Engineering of recent date pays a flattering tribute to the Worthington pumping engines:

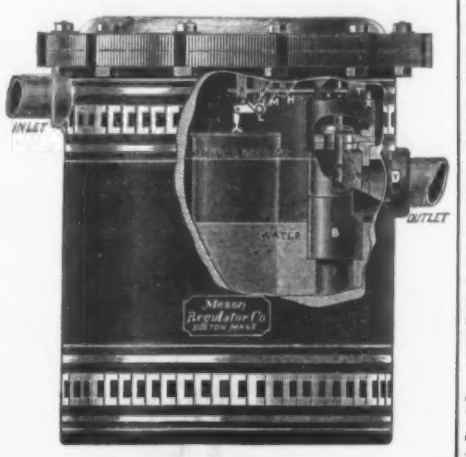
"We have on several occasions, says our contemporary, called attention to the high duties claimed for the Worthington pumping engine under ordinary conditions of working, and have mentioned the fact that this engine is employed in about 40 per cent. of the United States and Canadian water works, while it is the standard type used on the great system of oil-pipe lines that cover Pennsylvania with a network and carry oil continuously under pressures of from 1200 pounds to 1500 pounds per square inch, from Lake Erie to New York Harbor. The Henry R. Worthington Co., of New York, are by far the most powerful corporation engaged on the manufacture of pumping machinery in the United States, and the magnitude of their operations may be judged by the fact that at the present time the total amount of water delivered daily by their engines at the various water works in America is 1,000,000,000 gallons.

There can be no doubt that the admirable simplicity of these engines and their directness of action are advantages that strongly recommend their adoption by water-works engineers, and we have supposed that it was chiefly these features, combined with the contingent advantages of small cost for foundations and cheapness in maintenance, that had brought them into so much favor in the United States. Claims as to their economy of working had been strongly urged by the Worthington Co., who insisted that their engines could hold their own with the best types of Cornish or other pumping engines made in this country, but it was not unnatural to regard these assertions as being somewhat difficult of absolute demonstration. It is therefore satisfactory to known on the best authority that the Worthington Co. have not advanced any claims as to the efficiency of their pumping machinery that are not substantiated by actual results. Mr. J. G. Mair, one of the partners of Messrs. James Simpson & Co., of Pimlico, has recently returned from a visit to America, undertaken with the special object of satisfying himself upon this subject, and after having conducted an exhaustive series of trials he is fully convinced as to the efficiency and economy of this engine, and that, while being capable of as high a duty as the best types of pump made in this country, it has also the important advantages due to simplicity, lightness and cheapness of maintenance. Mr. Mair's visit has resulted in an arrangement with the Worthington Co., by which Messrs. Simpson & Co. will undertake the manufacture of the Worthington pumping engine in this country, and from the combination of two such powerful associations we may expect to see a remarkable development in this department of engineering.

The Mason Steam Trap.

The accompanying cut illustrates a new exhaust trap recently patented and put upon the market by the Mason Regulator Co., 40 Cortlandt street, New York. It is designed for trapping condensed water from steam heating coils, cylinders, vacuum pans, &c. Within the cylindrical shell, which is here shown with a piece broken out of the side, and which acts as the receiver for the condensed water, is placed a small cylinder, B, bolted to one side of the receiver at Y. Within this cylinder is a piston, connected to which is a valve, E, by the stem W. Through this valve the water passes when discharged from the trap. On top of the cylinder is a very small, perfectly-balanced valve at T, covering a small passage which extends down the cylinder B, and entering beneath the piston mentioned at the left of the cylinder is a yoke, R, which acts as a guide for the small valve, and also carries the mechanism for operating it. This consists of a weight, N, hung on a shaft, L, and counterbalanced by the bucket of water A. The shaft L carries two dogs or catches, which come in contact with a collar on the small valve-stem, and alternately open and close it as the bracket raises and falls.

The trap operates as follows: As the water enters through the inlet-pipe a portion of it enters the bucket A, and, filling it, causes it to drop, lifting the weight N and closing the small valve. This shuts off the pressure from the under side of the piston. The water immediately passes up the pipe C back of the cylinder B, and entering the chamber X above the valve E, under pressure, forces the valve E hard on its seat, as there is no pressure underneath. The water gradually rises in the trap until it reaches the point marked "discharge water line,"



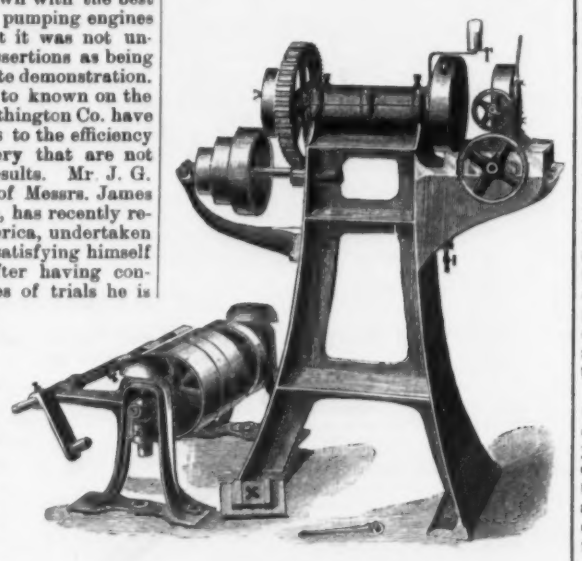
The Mason Steam Trap, Made by the Mason Regulator Co., New York.

when the bucket A becomes so light that the weight N lifts it, thus opening the small valve and letting pressure act through the passage in the cylinder and under the piston inside this cylinder. The area of the piston being twice that of the valve E, the latter is forced from its seat and the water is discharged up the pipe C through the valve E into the outlet-pipe. As the water lowers in the trap the bucket falls, repeating the operation described as often as the trap fills.

The advantages claimed for this trap are that it has no float to collapse or sink; that the bucket has an equal pressure inside and outside, and that the small valve is situated at the top of the trap and in the steam; therefore it cannot become fouled with dirt and scale. The valve operated is, moreover, large, and the water is thus rapidly discharged. The main valve finally is operated by steam and does not depend on any delicate mechanism for opening and closing.

New Pipe Cutting and Threading Machine.

Messrs. Forbes & Curtis, of Bridgeport, Conn., are putting on the market a new pipe cutting and threading machine, of which we annex a cut. The machine is designed to be quickly handled on all sizes of pipe from ⅛ inch to 2 inches, right and left. On pipe measuring from 1 inch to 2 inches the die-carrying head is furnished with opening adjustable dies which can be opened when the pipe is cut, thus saving reversing the machine and running back over the thread. On pipe smaller than 1 inch solid dies are used, although if desired adjustable dies can be furnished on all sizes. The four sizes of pipe from 1 inch to 2 inches are threaded without changing dies,



Pipe Cutting and Threading Machine, Made by Messrs. Forbes & Curtis, Bridgeport, Conn.

and all that is required to adapt them to the several sizes is to move a pin from one hole to another. The cutting-off attachment is self-adjusting. The chuck is of new design and of extra strength, and a centering chuck is also placed on the outer end of the spindle. The oil drip is directly under the sliding-head, and can be removed when full of chips. The machine is furnished complete with counter-shaft, wrenches, &c and can be arranged to be worked by hand.

The United States consular agent, writing on "How to Get New Zealand Trade," says: "The only difficulty which stands in the way of the more general introduction of American manufactures into this country is the want of facilities and opportunities for bringing the buyers into personal and immediate contact with the seller and his products. I would therefore suggest that intelligent representatives be sent out here to examine and ascertain the requirements of the country, and then manufacture to suit the same and send good representatives over to sell from samples."

American Institute of Mining Engineers.

The forty-fourth meeting of the American Institute of Mining Engineers, which has just closed its sessions in Pittsburgh, has been in many respects a notable one. The two chief attractions, natural gas and its application and the Clapp-Griffiths process, excited the liveliest interest among the visiting members. The excursions were so planned as to permit of an inspection of the gas, if not in its habitat, at least from its point of appearance on the earth, all the way through the wonderful system of pipe lines that lead it to the manufactories of Pittsburgh. This was supplemented by opportunities to examine its application to the various processes of iron, steel and glass making. The visit to the Clapp-Griffiths plant was preceded by a very lively and interesting discussion regarding the process, which hightened the desire of the members to investigate the various stages of manufacture of the steel and its manipulation in the rolls. To add to the pleasure of the visitors, for the first three days of the meeting the typical Pittsburgh weather seemed to have forgotten to materialize. In order, however, that the visitors might not depart without a due appreciation of the potentialities of Pittsburgh in this direction, Friday devoted itself to furnishing samples of its possibilities in this line. It rained, it was smoky and dark; there were occasional bursts of sunshine, and the day wound up with a snowstorm.

In our last issue we gave a brief *résumé* of the proceedings of the first meeting on Tuesday evening. It was so near our time of publication, however, that the acount was necessarily brief. Mr. Shinn's paper, to which we alluded last week, will be published in an early issue.

Mr. Wm. Metcalf, to whom had been assigned by the local committee the duty of enlightening the visiting members as to

NATURAL GAS,

followed in the subjoined interesting and witty statement regarding this fuel. It was generally believed that some of the points made by him covered in their wit a more than usual amount of truth:

Mr. President and Gentlemen: After the very able paper we have just listened to I need hardly tell you that in coming forward to speak on the subject of natural gas I will probably appear very much like an exhausted receiver. But then, Mr. President, you must know that I ingeniously managed during this visit not to have anything to do with the roasting of the members, in which I was so prominent seven years ago; but having taken to myself the position of chief loafer of our local members, I ran against a very serious strike, and it was determined that something should be done to break up this idleness. Upon the matter having been left to me, I decided that there ought to be a committee on natural gas, and that, inasmuch as I knew nothing whatever about natural gas, I was the proper person to be the chairman of that committee, and being so entirely fitted for the duties of chairman, and the appointment of the committee having been left to myself, I have the honor to announce to you that I am also the committee.

Knowing nothing, Mr. President, of the subject about which I am to talk, I can assure you that, like a noted Senator, I can talk a very long time; but, after having listened to your very eloquent address, I am also compelled to feel that I am in this case very much of a charlatan, though I can say to you, Mr. President, I have received no fee, either actual or contingent. The first question that would naturally arise in the minds of the visitors who have come here, as I understand it, mainly to hear and learn about it, would be, What is natural gas? What is its composition? What are its properties? My talk to-night is not at all statistical, and for a very brief and able answer to all such questions I will refer you to the report of the committee of the Engineers' Society of Western Pennsylvania, which was read here some years ago before the meeting of the American Society of the Mechanical Engineers, and which has been published widely. The secretary of that society, Mr. Wickersham, will be very glad to furnish copies to any members who may desire them. Here the composition, the properties, the qualities, the quantities and characteristics of natural gas are more fully set forth than I could give them to you to-night.

The question next arising would be as to where this gas is found. I will begin by saying it was found in China about 18,000 years ago, and has been used by the Chinese ever since, as near as we can figure it out by their statistics. It was found in New York about half a century ago, and has been used continuously since for heating and lighting the town of Fredonia. Therefore we may safely say to all of you that if you will only bore deep enough you will be pretty sure to strike it. The next question, then, is as to the quantity of this gas that may be obtained. That is arrived at, first, by calculating the cubic contents of the earth, less the known thickness or the cubic contents of the known solid crust. We know the thickness of that crust. It was given to us in our old geographies as 5 miles. Now if you will take your pencils and calculate the cubic contents of the earth, less the circumscribed sphere, 5 miles in thickness, you will have he cubic contents of gas that may be, and I say are, contained in the earth—because we have got it on the other side of China and we have got it here. Is that way we get at the cubic volume, we will say in square feet. Now, then, the question comes in as to the condition of that gas. You may have so many cubic feet at a given pressure, and that quantity of gas at certain other pressure or less pressure will give you an enormously greater number of cubic feet. In considering, then, how many available cubic feet of this natural gas we have, we have to first consider the condition in which that gas exists in the earth.

This brings us to the theories as to how the gas is formed. We were first told it was formed at the same time and in the same way that the coal measures were formed, because it was found in the coal country, but we do not know of any very great developments of coal in China (I suppose they did not develop it because they had gas), and we set that aside. We were next told that this gas was formed from petroleum, because it is always found in connection with petroleum. Although the great gas wells are not found directly in the oil fields, neither are the great oil wells found in what are now known as gas fields, yet the first roarers were found in the oil country years ago, too far away from Pittsburgh to be utilized here, and were very largely allowed to go to waste. It is a fact, I believe, that almost, if not entirely without exception, they find gas in every oil well and in sufficient quantity to raise enough steam to enable the owners to pump the well when it ceases to flow.

Then we were told that petroleum and gas were formed by the decomposition of the bodies of fishes and marine animals which were deposited by the great seas that once swept over this part of the world and became dried up. This hardly satisfies the mind when we consider the great quantities we have already discovered. We were next told that it was formed by the action of salt water in the earth. I may say here in passing that this solves one of my childish and youthful doubts as to where all the water went to that fell down upon the earth from the skies and ran into the rivers and thence to the oceans. Science may tell you that the sun picks it up and sends it all back, but that is not altogether so. It is now said that it runs to the sea, and there takes up the salt, passes on downward into the earth, and the salt water comes in contact with the hot carbon core of the earth; the water is decomposed into its component parts of oxygen and hydrogen, the hydrogen takes up the carbon and forms the hydrocarbon, in which form are our coal oil and the gas, and the oxygen goes—the writer did not say where. But after the salt water has first gone down into the earth and then been converted into steam, and then, in spite of our notion of gravity, has gone on down until it has come in contact with this hot carbon and been formed into gas, it immediately turns and tries to force its way out under great pressure, and thus we find it when we bore the well.

This might seem altogether ridiculous if it were not further shown by very eminent scientists that the chemical reactions are not going on all the time down there, but that the elements are simply brought together in their proper and necessary proportions to produce this natural gas, but under such an enormous pressure that the chemical reaction cannot take place. Therefore there is no such reaction going on at present inside of the earth, but when we drill down and tap into these chemicals and relieve the enormous pressure under which they exist we immediately have the chemical reaction, and then the solid flow of gas come out to us in the form in which we get it in our wells. Now, proceeding again to the calculation of the volume, we may say that we have the given number of cubic feet of solid gas down there, and if anybody knows exactly what pressure it takes to solidify the hydrocarbon he can easily calculate how many cubic feet of gas there are there. That it can be solidified is well proven by the fact that all kinds of fixed gases so far have been solidified in the laboratory. But when we come to consider the question in another light—that is, the practical light that we want to look at in—the best conditions under which we can use it—we do not want to count so many hundred atmospheres of pressure, nor so many thousand pounds of pressure, nor so many hundred pounds, but we want to reduce it down to so many ounces. Now, according to well-known laws you have your cubic feet in your numerator and your ounces in the denominator of your equation, and you begin to make a division and your figures will string out very long. But if you take the word of the best practitioners, those who have had the best success in utilizing this gas, you will discover finally that it can be best and most economically used at low pressure—when all the pressure is relieved. Now, if you introduce this pressure into your denominator you can make the numerator of your equation unity, and the result will be, when divided, unity divided by zero equal to infinity—that is, the quantity of gas we have. Well, it may seem absurd to you, gentlemen, but when you go out into the gas country with us to-morrow you will find that the moonlit sky, bright now as it is, is paled by the beautiful lights that sweep up around you, and that the hills are lit up in every direction, as well as our streets and our rivers. If you go on to a hill top within a radius of 20 miles of Pittsburgh any night you will find the whole horizon grandly lighted by the immense jets of flaming gas flowing everywhere. If you go around our streets and observe the beautiful gaslamp posts that are erected everywhere with iron torches on top you may wonder what they are. They are only to let the gas escape, not to light it nor utilize it.

If you will go into our mills and see the gas not only utilized in every possible way, but see it burning, blazing all day long, no no matter even if the sun should accidentally shine, if you will go into our houses and see that beautiful adaptation to domestic purposes of which Mr. Shinn spoke so eloquently, and see enough gas going at every grate to keep a great big open-hearth steel furnace going, you will satisfy yourselves—if you do all this—that not only the figures are correct, but that the gas producers believe it, and that the gas consumers are using it, and that we are all going on the theory of infinity. It does not matter that a paper was read a few years ago before our local society showing that we threw away $1,000,000 a year in this county keeping up bonfires at the tops of our stacks. It does not matter that our best engineers tell us to-day that we are wasting in this gas territory more than $2,000,000 worth of gas every year. It does not amount to anything, because the equation proves that the quantity is infinite.

Having settled the quantity, the next question that naturally arises is, What use do we make of it? I can say that we use it everywhere. If you go into our mills you find it used for puddling. The puddler no longer has to wrestle with great piles of coal, and rattle grate-bars, shovel out ashes and do the hard work of his business, but, as one of our largest ironworkers says very truly, he now does his puddling with kid gloves on. He has only little valves to turn. You will also find it in our heating furnaces. You will find it in our melting furnaces. You will find everywhere that the hard and dirty labor, the breathing of the fumes of coal, smoke and ashes, are all done away with, and you will find all the men who are operating in our mills correspondingly happy in the utilizing of this natural gas. Go into the boiler-house; it is no longer the dirtiest and smokiest and hottest place around; the men are no longer the most difficult and troublesome to handle; but you will see the walls whitewashed, the boilers painted, the floors swept up, and the fireman sitting there, probably in a comfortable arm chair, watching the gas and the water gauges. One man where 20 were required before. You will also find it used for domestic purposes in very many, if not all, of outhouses, and all the people correspondingly delighted. The ladies that they have no coal to be carried up stairs or lugged around the house; no dropping of heavy lumps on the carpets, and no scattering of ashes around the house; no dirt and no trouble, and you might think that you had come to the elysium of combustion.

The next thing you want to take into consideration is the economical advantages of natural gas, and the question would naturally arise in any one's mind: "Is it an unmixed blessing?" You will find when you go into the houses that the grate which used to be all black and grimy is whitewashed and painted and filled up with beautiful brickbats, which are also whitewashed. Then there is the beautiful gas fire, and it seems to be whitewashed, and the whole thing is very ghastly-looking, indeed. You would naturally think there certainly could be nothing but a blessing here. I wish to describe briefly the way in which the gas is introduced into the fireplace. The grate is cleaned out, the inevitable plumber comes and brings a large, square cast-iron plate, which is hollow, anywhere from 12 to 18 inches long and 12 inches wide, perhaps, and 1 inch deep, with an arrangement to fasten a pipe on the under side, and a whole lot of little holes at the top and side. That is called a "combustion chamber" or mixing chamber. Fastened to that they put a pipe with a little cap, which works on the principle of an injector, called an "air mixer." Below that they fasten on the gas-pipe, and then they are ready to turn on the gas and burn it, you will say. Not by a good deal. They go then and fill the grate up with brickbats, or old crucible, or chunks of slag, or anything of that kind, and then they turn on this gas, which is about one-half the weight of air, under a pretty lively pressure—they say only 4 ounces, but you will consider what 4 ounces more than the atmospheric pressure means when the gas is only half the weight, and then they begin to say that this is a great deal drier fire than a coal fire. Why it is drier I do not know, because all of the gas I have ever seen is full of salt water, but they say it is. I venture to say that in every house in this city where that abominable contrivance is used, inside of six months the physician will recoguize a distinct and very serious set of diseases due to natural gas, and if I were going to make a prediction it would be vertigo, fullness of head, tendency to apoplexy, nausea, sore throat and dried-up lungs. That is the unmixed blessing of using it as a domestic comfort in the way in which it is now applied. I have tried it in my office for a few weeks, and I promise if any of you should come here next winter, if I cannot find some other way to burn it in the office, you will find the coal bucket, the poker and the tongs there.

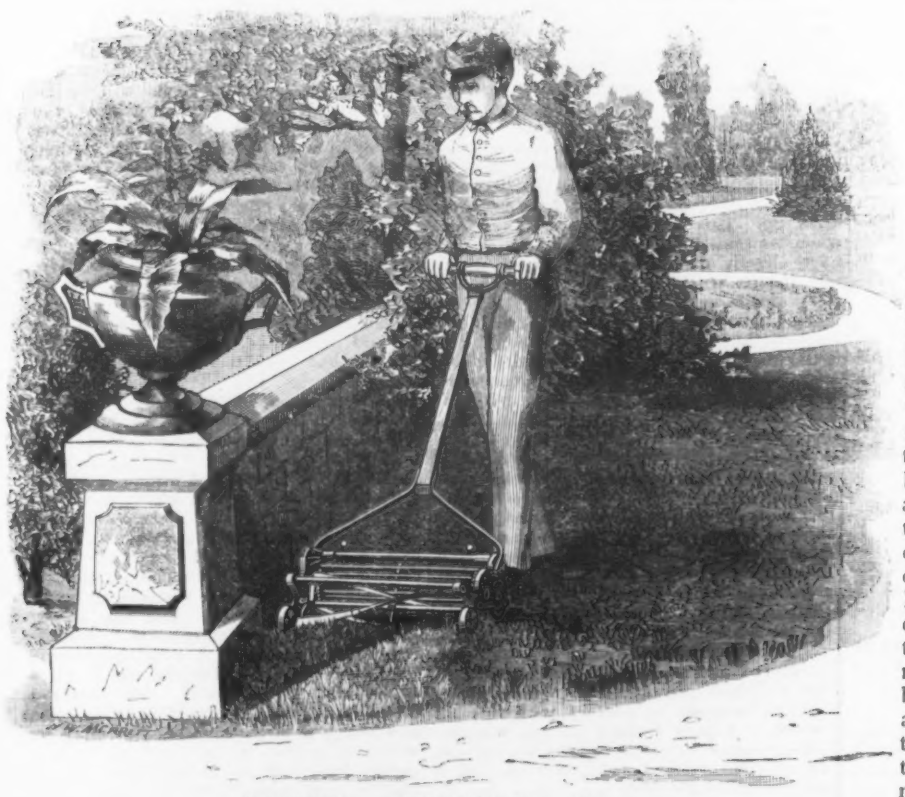
Now, in the mills it is surely an unmixed blessing. I ought to have stated, by the way, that in the houses it costs a good deal more than coal, but surely in the mills it costs much less than coal, surely it is much cheaper, surely it has done away with a great deal of labor, surely it has reduced the wear and tear in every way. Certainly there it must be an unmixed blessing. Well, that is a very great mistake. There is not a manufacturer in Pittsburgh to-day who has been using natural gas in his mills for six months who has the slightest conception of what coal ever cost him, or what the labor of handling it cost him, or what the saved labor in doing away with the using of coal amounted to. He is altogether engaged in figuring up just how many thousand dollars a year he is paying that abominable gas company and trying to devise some way to reduce it. We have got altogether away from the economical advantages. Then, when you consider the number of firemen, the number of laborers, the number of gas-makers and the thousands of coal-diggers who have been thrown out of their usual avocations by the introduction of this natural gas—be it said to their credit without a murmur; they have had the intelligence and the character, which they all possess, of first-rate American citizens, to accept the inevitable and make the best of it without a complaint—if you go among them you will hardly find that they will say the introduction of natural gas is an unmixed blessing.

Now, what of the future? We heard a little of one side of it to night; let us look at another side. In the first place, as I have said, the manufacturers have already forgotten what coal used to cost them, and are figuring now to get gas cheaper. In the second place, all the rest of the world still believe that there are some very great economical advantages in Pittsburgh in the use of natural gas, and you gentlemen who are visiting us have come here to study what those economical advantages are, in order that you may go back to your homes determined that Pittsburgh shall not absorb all of the manufacturing industries of the world—determined that you will study out the best method, and the most economical, of reducing slack, anthracite dust and everything else to gas, and get a cheap fuel which shall enable you to at least live against the competition of Pittsburgh, and, if you will bear in mind what I have told you about the forgetfulness of the Pittsburgh manufacturer

THE "NEW EASY" LAWN MOWER,

MANUFACTURED BY

Blair Manufacturing Co., Springfield, Mass., U. S. A.



SPECIAL ADVANTAGE, No. 1.

The "NEW EASY" is the *only* Lawn Mower that will cut to within *one inch* of walls, fences, shrubbery, around trees, &c. (See above cut).

To the Hardware AND Agricult'l Implement Trade.

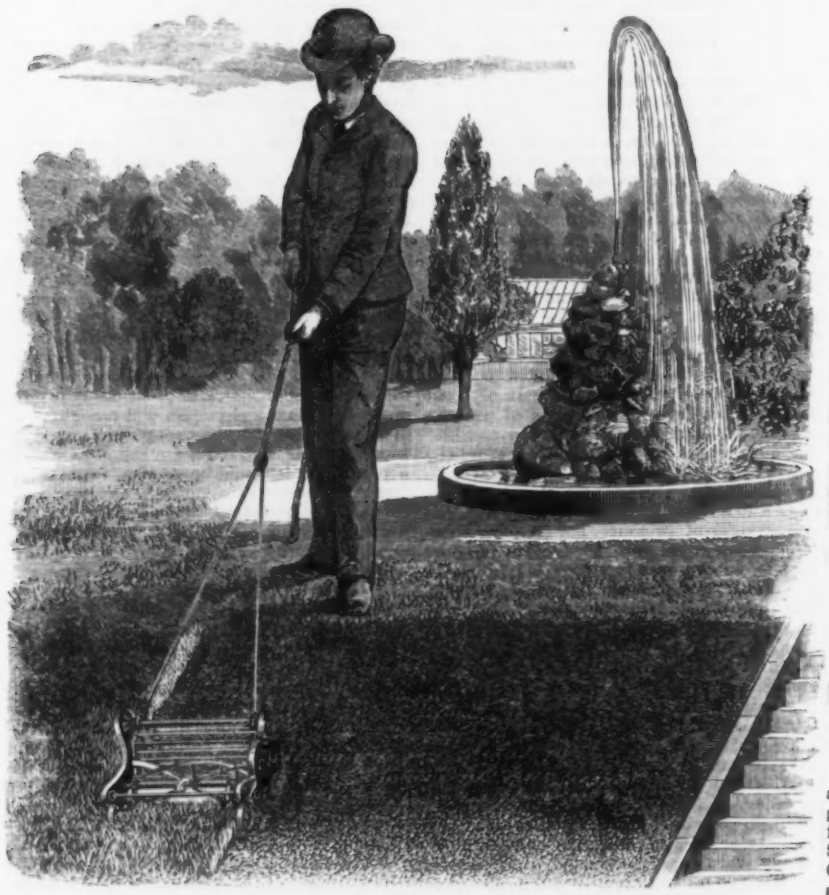
Special Notice.

Do you want to handle the Lightest Running, Easiest Cutting, BEST SELLING Lawn Mower in the market? If you do, examine carefully the merits of the "NEW EASY," and you will know what Mower to buy. No Lawn Mower has yet been made that approaches so near to the ideal Machine for every kind and variety of work as the "NEW EASY." It stands pre-eminent and alone as the only perfect Mower manufactured, and combines the characteristic and exclusive advantages of the front-cut, traction-roller style of machine — viz., adaptability to every grade of lawn work, with extreme ease of operation.

SPECIAL ADVANTAGE, No. 2.

The "NEW EASY" is the *only* Lawn Mower that will run off its level and cut low terraces, mounds, flower beds, &c. (See above cut.)

Herewith are illustrated a few of the *special* uses to which the "NEW EASY" is adapted, and that are not possessed or claimed for any other Mower, while for general purpose work it is *Chief of the best.*



SPECIAL ADVANTAGE, No. 3.

The "NEW EASY" is the *only* Lawn Mower with sufficient traction to cut high terraces with rope attachment. (See above cut.)

Notice the "New Easy" Lawn Mower and What We Claim for It.

We do not advertise the "NEW EASY" as a Field Mower, nor assert that it will cut grass 12 inches high with perfect ease; but for a Lawn Mower. Strong, Durable, Easily Sharpened and Adjusted, of Varied Capacity, Graceful Form, Long and Pleasing Service, and so easily operated that a lady or child may use it without fatigue, we *do* claim the "NEW EASY" to be without a rival; and our Agents are authorized to sell this Mower with the express guarantee that these claims shall be verified by trial.

SPECIAL ADVANTAGE, No. 4.

The "NEW EASY" is the *only* Lawn Mower that will cut *narrow borders.* (See above cut.)

Every Mower unconditionally warranted. Made in Seven Sizes. 10 in. to 24 in. All for hand use.

Catalogues and Price Lists of our Lawn Mowers, with discounts to the Trade, furnished on application to any of the following

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Parker & Wood, Boston, Mass.
L. M. Rumsey Mfg. Co., St. Louis, Mo.
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E. S. Bristol & Gale, Chicago, Ill.
Samuel G. B. Cook & Co., Baltimore, Md.
Rice, Born & Co., New Orleans, La.
Buhl, Sons & Co., Detroit, Mich.
B. L. Bragg & Co., Springfield, Mass.
George B. Bahr & Co., Louisville, Ky.
Scobie & Parker, Pittsburgh, Pa.
Baker & Hamilton, San Francisco, Cal.
Baker & Hamilton, Sacramento, Cal.
T. & A. Pickering, Cincinnati, Ohio.
George Worthington & Co., Cleveland, Ohio.
Bostwick, Braun & Co., Toledo, Ohio.
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already, you will not find the path quite so hard as you thought it might be. That will be your earnest study. The best brains—the best engineering brains at least—of all the country will be devoted to studying the most economical mode of using and utilizing the solid fuel outside of the district where the natural gas is easily obtained.

It might be supposed that while that was going on the engineers in Pittsburgh would, of course, follow up your progress and your studies and keep themselves posted and well informed, but we will not do anything of the kind. Whenever we pick up *The Iron Age* or the *Engineering and Mining Journal* and see a description of your economical and beautiful gas furnaces, and the figures as to how cheaply you can make gas, and what quantities of steel and iron you can puddle, and so on, to a ton of coal, we will pitch it all aside. We have no interest in that. We have natural gas—that will do for us. We don't want to be bothered about any other fuel. Then, if we should come to the end of our equation, and should happen to find that infinity was not exactly a correct answer, what would be the result? We would not have a manufacturer in the town who would know the proper cost of solid fuel; we would not have an engineer in the community who would know how to build a good gas plant; we will not have a puddler in the town who would know how to handle a furnace fired with coal; we will not have a heater in the town who will know how to heat a heat of iron or steel with solid fuel; we will not have a single glass-maker in the town who would know how to make glass, and we would not have a single fireman who would know how to raise steam with coal, and then, when the manufacturer began to find out that his coal was going to cost him a great deal more than his gas did, or he supposed it would, he will say, "Well, I have got to have all this work done a great deal cheaper," and when the puddler and the heater and the fireman and the gas-maker find that they have to go back and double up the amount of labor they had to do before, and wrestle with this dirt and ashes, and so on, they will say: "I am not going to do this double work for these wages, and I want my wages increased." The result is you will find presently there is going to be an almost universal hubbub in this community; there is going to be a pretty lively time if natural gas gives out, if you can possess your souls in patience until that day. You might say, perhaps, it would be a very bad time. They will be bad in one sense; they will be noisy, probably, but there is a good old solid substantial element in this town which has covered it all over not only with its industries, its warehouses, its factories, mills and all that, as well as such buildings as this in which we are meeting, but which is fully imbued with the principles laid down in our Government by our old Puritan Fathers, that the only safety to the community is for every man to obey the law, and there is very little danger, if left to ourselves, that we are going to have any more serious trouble when this time comes than a very great hubbub. It will be one side against the other, and it will go on with a good deal of noise, but without calling in any outside assistance and without the smashing of any furniture, until one side or the other will find that the other side is in dead earnest, when the side which is not quite so much in earnest will back down, and we will shake hands and go ahead again. But we are told we are going to double this town in 14 years. Well, I have been told that we are going to treble it and quadruple it, and the next 10 or 15 years we will have 500,000 population in the city of Pittsburgh.

Now, I want to say something in regard to that. If we do, and if the people who come in here are not just exactly the same kind of people we are, and if they do not understand just how to indulge in these little family quarrels without hurting anybody, as we do, if we get 500,000 people here who are entirely unconversant with our way of doing things, then there may be very serious results, and I can only say to any of you gentlemen who may have come here (although I do not know that any of you have) with any idea of looking around to see if this is a good place to locate or not, that if you expect to live a long time and enjoy an old age, with peace and quietness, do not come.

Dr. Raymond read a brief but appreciative biographical note on Mr. Oswald J. Heinrich, of Drifton, Luzerne County, Pa., who died on the 4th inst., at the age of 59 years. Mr. Heinrich was one of the earliest members of the Institute and had been prominent in its councils and at its meetings. Its "Transactions" show the wide range of subjects which occupied his attention and his standing as an engineer. It was remarked that this meeting called together more of the older members of the society who had impressed their individuality upon it, and made the Institute such a success, than had assembled for many years, and the expressions of love for Mr. Heinrich and regret at his death were heard on every side.

Wednesday's Excursion.

At 9 o'clock a special train furnished by the courtesy of the Pennsylvania Railroad Co. left the West Pennsylvania depot, in Allegheny, for a trip over the West Pennsylvania Railroad and the Allegheny Valley Railroad. The day was devoted chiefly to the inspection of natural gas and its uses in various processes of manufacture. Eight passenger coaches were filled with the visiting and local members, and when the train run into the Union station, in Pittsburgh, at 5 o'clock in the evening, only one minute behind the advertised schedule, the excursionists were loud in their praises of the beauty of the day and the enjoyability of the trip. The first stop was made at the Pittsburgh Plate Glass Works, at Creighton. At this place the members were convinced of what few of them had even heard rumored, viz., that plate glass equal to the best imported French glass was being made in the United States. At these works there are two furnaces in operation, one with 12 pots and the other with 16, and a third with 20 pots is building. The present capacity of the works is 16,000 square feet per week. The visitors had an opportunity to inspect the entire operations of making plate glass, from the casting, rolling, grinding, smoothing and polishing to the cutting and packing. Each visitor was presented with a beautiful specimen of the product of the works, showing as fine polish and as clean color as the best imported.

After running 2 miles the train stopped at Tarentum, where some 200 of the excursionists took carriages to visit Station No. 5 of the Philadelphia (Westinghouse) Gas Co., 1½ miles distant. At this place the gas was allowed to blow off to show the visitors the pressure of the well.

On the return the train was run to Freeport, where it crossed the Allegheny River to its left or Pittsburgh bank, at which point the Allegheny Valley Road was taken, the return trip to the city being made over this road. A most elegant lunch was prepared and served under the auspices of Mr. Schlosser, of the Duquesne Club. The center piece on the table was a 38-pound salmon ornamented with the Institute coat of arms. Freeport was reached, the river crossed and the train on its way to the city before the lunch had been fully served and the vote of thanks tendered to Mr. Schlosser. The Crescent Steel Works, of Miller, Metcalf & Parkin, at Lawrenceville, were reached after 2 o'clock, and half an hour was spent in inspecting this most complete crucible steel works. The ladies were especially interested in the very fine rods for dental instruments and the exceedingly fine steel wire.

At Thirty-sixth street a stop was made in order that the natural gas might be turned into the blow-off pipes of the Philadelphia Gas Co. The gas was turned into the four 8-inch stand-pipes, which are 200 feet high, and the roaring of the escaping gas and brilliancy of their united flame, when lighted, evoked constant expressions of astonishment.

The largest steel hammer in the United States was seen at Park, Bro. & Co.'s steel works, where a stop of a few minutes was made, after which the excursionists visited and inspected the O'Hara Glass Works, being chaperoned by Mr. Jas. B. Lyon, who has been so long connected with the glass industry in this city. One of the most interesting features of the visit to these works to the engineers present was the arrangement for supplying benzine to the furnace fires in case of short supply of gas, or an accidental or intentional cutting-off of the supply. The ladies were especially interested in the beautiful samples of colored glass and imitation of diced cut glass here shown. The last visit was made to the works of the Pittsburgh Steel Casting Co. where Mr. Wm. Hainsworth's methods of rabbling the steel in a Bessemer converter after recarbonization, and his soaking-pits, which in some of their features antedate Gjer's, were inspected.

Wednesday Evening Session.

Another large audience gathered in the chapel of the First Presbyterian Church on Wednesday evening, and they were more than repaid for their attendance. The paper read by Prof. J. P. Leslie, on the "Geology of the Pittsburgh Coal Region," though upon a subject that is generally regarded as affording but little opportunity for statements of interest to the general public, was not only full of interest to the professional gentlemen present, but was a production of unusual literary merit and entertaining to the general listener. We shall give an abstract of its contents in a future issue, omitting only the scientific discussion of the geological formations.

The second paper of the evening was a very interesting one by Mr. Wm. Garrett, of Pittsburgh, manager of the Alvin & Roberts Wire Mill, on

PECULIAR PHENOMENON IN THE HEATING OF OPEN-HEARTH AND BESSEMER STEEL.

I have heard it said that the late Mr. Holley made use of this remark: "There is an inherent cussedness about rolls which so far no man has been able to find out." I think this can be safely claimed in reference to steel, as there are certain peculiarities about it that are pretty hard to account for.

Previous to the introduction of the Bessemer process there was, as it were, a great chasm between iron and crucible steel, and, outside of what futile attempts had been made in puddling steel, nothing had been done to fill this gap. The Bessemer steel struck a medium between the two, the softest of it not being able to take the place of good iron, while the hardest was not suitable to encroach very far into the crucible-steel trade. The open-hearth process made quite an inroad into the latter, but only for the lower and cheaper grades, and beyond a doubt, for the finest grades of tool steel, the crucible-steel business has a long life before it. On the other side of the line comes the basic process, which brings us a step nearer iron; but to fill up the gap completely comes the Clapp-Griffiths process, which makes a grade of material—call it what you will—that is as soft as iron, welds as readily and is in a fair way to supersede iron altogether.

Having been in the employ of the Cleveland Rolling Mill Co. for 15 years, having charge of the merchant and rod mills, in which we rolled steel made by the Bessemer and open-hearth processes, which varied in carbon from 10 to 80, and as we were in a great measure pioneers in the introduction of steel to supersede iron as far as we could go on the one hand, and that of the cheaper grades of crucible steel on the other, our experience was both varied and interesting. A large business was done in making buggy and seat springs, and after getting the analysis of every cast carefully, and in spite of the trouble taken in picking out the pig metal, we often got into trouble with our steel, some being too soft to temper and some too hard or brittle. On analysis we often found the soft steel, if anything, higher in carbon and sometimes both hard and soft precisely the same in carbon, silicon and manganese.

After adopting a mechanical test—which was to roll a test piece, say, 1½ wide by ¼ thick—and by bending it over judge from the way it bent and broke as to quality, and by using care and judgment, we got along very well. Occasionally we came across some steel which was chemical according to formula, but which broke very short and brittle. For this grade of steel by the Bessemer process we found that from 0.60 to 0.65 in carbon was the best suited to our purpose, but when we began to use open-hearth steel, although using the formula, as for the Bessemer, we found it would not temper, and we had to raise the carbon up to between 0.70 and 0.75 in carbon before we got it to answer the purpose. The reason for this strange peculiarity I could never discover. I may add that the carbon, phosphorus, silicon and manganese were practically the same in both kinds of steel.

The softer grades of steel by the open-hearth process, say 0.10 to 0.13 carbon, were used largely for special grades of wire rods and for sheets. In the latter we again came across some very strange results. Some of the steel would roll into sheets as nice and pliable as we could desire, drawing out in length like iron. Then, again, some were stiff and rigid—in fact, we could do nothing with them. On examining the analysis we frequently found the soft and pliable sheets were made from steel a few points higher in carbon than the other, and sometimes both the analyses were the same. When the manufacture of a low grade (in carbon) by the Bessemer process came into general use (say, 0.10 to 0.12 carbon) we again found this strange peculiarity, that, although the same in carbon, phosphorus, silicon and manganese as that made by the open-hearth process, it is very much harder and stiffer. This could be easily noticed in the rolling.

In reference to the basic steel I have very little to say, having handled comparatively little of it. I understand, however, that a material can be made by this process that will analyze exactly the same chemically as some of the finest Swedish bar used for melting purposes, and yet when put into the crucible pot and melted the result is very different. This surely is somewhat peculiar.

I have had the opportunity in the last six months of handling a large quantity of the Clapp-Griffiths steel, and in all my experience, especially in the wire-rod line, I never had any steel that rolled so soft and pliable, and it will stand as high a heat as iron. We have often taken rough, defective, scabby blooms and given them as much heat as an iron pile, and without any delay whatever put them through the rolls, which welded all defects and gave us a good finished product. This steel comes nearer to good, strong iron than any I have ever seen, and, in my opinion, has a very important part to play in the near future in the iron and steel business. It will do more to supersede puddling than any other process, because it stands a higher heat, welds better, is softer and more pliable than any other kind of steel manufactured at the present time.

Before we adopted our mechanical test to determine the quality and grade of steel we relied entirely upon the analysis of the chemist, and whenever we sent any steel away which turned out to be too hard, breaking very short or breaking when testing the springs, we would analyze what was returned, and if we found the carbon within certain limits we claimed that the steel had been burnt or overheated before the rolling. This was certainly at first sight a reasonable conclusion to arrive at. Taking into consideration our past experience in the heating of iron—and it is a well-known fact that overheating or burning iron makes it brittle, the fracture showing the grain coarse and ruining the quality of the material—nothing was more natural than to come to the same conclusion with steel. Indeed, more so, seeing that crucible steel, on the other hand, had to be heated at a very low heat and with great care. Laboring under this belief, then, when steel broke short and brittle we said it was overheated or burnt. This was a matter of a great deal of annoyance, both to the men we employed to heat the steel and to the man who had charge of the rolling department, the former claiming that such was not the case. In some departments many heaters were fined and some discharged. Then the man in charge of that department, when complaints of this kind were reported, would take special pains and would see almost every piece of a certain lot rolled, but as soon as confidence was in a measure restored another batch of burnt steel would be reported again, and, in spite of all the protestations of the man in charge and the men who worked the steel that it had not been burnt or overheated, claiming that there must be some other cause for it, the chemist would say: "I have analyzed the steel, and find it not different from the general run, which worked well." The opinion of every one was that the chemist was right, and that therefore the steel was burnt; hence it broke short and brittle, and to back up their opinion they would say: "Why, look at the grain or fracture; how open it is, and somewhat silvery in appearance."

To save a good deal of needless discussion, I will here state we are perfectly aware that beyond a certain limit carbon, phosphorus, manganese and silicon have a tendency to harden steel, and sometimes we traced the trouble to that source. I speak of those results occurring when chemically they could not be accounted for. But can we tell the quality of steel by the fracture? I claim that the only stage in the manufacture of steel where the quality as to grade of carbon can be determined by the appearance of the grain or fracture is in the crucible ingot, and that only before it is put into the heating furnace. Take a spring-steel billet, heat it to the proper heat, and before rolling cut a piece off. Roll the balance to 1½ x ¼ and after both are cold break them. The grain in the billet will be very coarse and silvery bright, while the grain in the 1½ x ¼ piece will be close and fine, and yet the quality is precisely the same. The reason is plain. Heating the billet opens the pores or grain of the steel; rolling compresses them again. Now, take a piece of this 1½ x ¼ spring steel, heat it to a bright red, and then let it cool, and on breaking you will find the same coarse grain as in the billet. Now, heat it again, retaining one part of the bar in your hand outside the furnace door, until the end inside gets quite hot, gradually getting colder as it nears the door. Now, plunge it into cold water and break it inch by inch. The first breaks shows a grain as fine as the finest tool steel, the next not quite so fine, and so on—the cooler the piece was before putting into water the coarser the grain. In that bar will be found many different grades of steel, so far as the appearance of the fracture shows, yet they are of the same quality as the piece broken off the bar that had not been dipped in the water and looked like pot metal. But you may say there is nothing peculiar about that, as it is a well-known fact that heating steel opens the grain, rolling compresses it and dipping hot into water closes it. This is quite true, but it is most peculiar how many men of good common sense and sound judgment, in spite of this well-known fact, will examine the grain of a bar of rolled steel and say: "This is good steel or bad steel, or has been destroyed by being burnt." Do we change the chemical properties of steel by overheating, or "burning," as it is termed? This sounds like a satire on the manufacture of steel, though I have only stated facts, and one is apt to conclude that to put carbon in or take it out you must first melt your metal, but the well-known fact that Swedish bar can be carbonized by the cementation process knocks all that theory in the head; so we are still left in doubt.

But do we affect the carbon in the steel bloom by burning or overheating the steel, and, contradictory as it may seem, make the finished product brittle? I claim we do not. But assertions do not prove facts, so let me give you a case in point, which is another illustration out of many of how old and established theories are some times proven wrong by accident, and which made a convert of me on this point for all time to come. One evening after I had left the mill I was sent for in a hurry, as the lever of the damper had broken and the damper had fallen off the stack. In the furnace we had 5-inch blooms to be rolled into 1½ squares for spring steel (the carbon was 0.74). The heat was just about ready and the heater had just put on a heavy fire and was putting the damper down when the lever broke. He in his fright lost his presence of mind and did nothing but pull the doors up. Meantime the heat was getting hotter and hotter, and as it was some little time before I arrived the blooms had gotton so hot that the top side of them had melted and run, and some of the metal had taken root, as it were, in the furnace. Having told them to take the grate-bars out at once, the furnace and steel began to cool, but my mind was made up that the 4000 pounds of steel we had in the furnace were ruined. However, noticing some of the blooms next the flue in pretty fair shape, I began to roll from there, intending to stop as soon as the blooms began to break up in the rolling, as I expected they would do. To be brief, every bloom in that heat rolled well, although some were so much out of shape that we could hardly get them in the rolls. The next day I took a small billet off the bloom that was the most burnt, rolled it into 1½ x ¼, and when we tested it it turned out well. I had 500 pounds rolled as a sample lot. Report came back: "Sample lot first-class steel; send all like it." Shipped the balance and had no complaint. I took a piece off the billet to the chemist, but said nothing about the circumstances The result showed carbon 0.74, same as carbon of the cast. After that I made quite a number of experiments and all turned out as above. One was as follows: We used a box pile iron for the sides, top and bottom, and steel billet crop ends in the center (rail carbon). I took a long crop end and cut it in two, marked one piece with a cross, piled this in the box pile right on top next the iron cover, charged the pile in the hottest part of the furnace and gave it the hottest roasting we could, so much so that the pile was like mush, pulled it out carefully and threw it down without rolling. When perfectly cold, with great difficulty we parted the cover, got the marked piece and sent both to the chemist. The carbon was exactly alike in both.

The fact that steel will not be rendered brittle nor lose any of its properties by overheating may not be new to many of you here, but it is not by any means commonly known and admitted. I would not be surprised if I should be severely handled for my heresy, so common is the belief that it is injurious to heat steel as high as iron, so I want first to state that I confine my remarks and assertions to Bessemer, open-hearth and Clapp-Griffiths steel, and that only after it has been bloomed. In what I have said I have only spoken of what I know, and testify to what I have seen. This incident happened over six years ago, and since that time I have experienced many things that have seriously impressed on my mind that our method of heating steel at such a low heat was wrong. Strange as it may appear, I am positive that, if you take an iron pile and a steel bloom and overheat both, you will find when rolled that the iron is ruined in quality, while the steel is as good—if not better—in quality as it was before it was heated. Why should we be afraid to heat our steel? Is it not common practice for all crucible-steel makers to heat their highest grades of tool steel to a welding heat to weld up the seams? Is not a Bessemer, open-hearth or Clapp-Griffiths ingot more porous and honeycombed than crucible? Hence the greater reason why heating to a welding heat is requisite. Is there a steel manufacturer here who has had complaints that their steel was seamy? This would not have been the result had you heated your steel to a welding heat; then by hammering or rolling with a light reduction welded up the streaks in your bloom, which are the round pores of your ingot elongated. The only reason why I can think that all steel should not be treated in this way is not that it would injure it in any way, but it would add to the cost, as the waste in heating would be greater and would curtail product with the same plant. I will venture to predict that the future requirements of the steel trade will demand this method of heating steel, or a very much improved method of making sound ingots. In either case I am of the firm opinion that "overheating" steel, as it is termed, is not injurious to the quality if allowed to cool again, so that it will stand rolling.

In conclusion I would say to those who are skeptical on some of my remarks to go slow, and remember that this is not the first time old set ideas of long standing have been found wrong. I mention this because I have found so many who, at the mere mention of the fact that steel would not be injured by overheating, would lose all patience, and when I still would persist they no doubt, in their own minds, would come to the conclusion that I might be right in some things, yet on this point I was very wrong. Chemistry may prove that carbon has an affinity for oxygen, and in a reverberatory furnace at a high heat there is a good deal of it passing through it before it will take up the carbon out of the steel. It is a well-known fact that manganese is very volatile, and that it would be apt to be taken out of the bloom when at a high heat, and, admitting that such facts in theory are true, yet it is proper for you to deliberate this calmly, for practical facts are stubborn things.

This was followed by a

PRELIMINARY NOTE ON THE CONSTITUTION OF CAST IRONS, BY C. B. DUDLEY AND F. N. PEASE.

Those who have worked a good deal on the chemistry of pig irons of which the physical properties were known cannot fail to have been struck by the remarkable want of relation between the physical properties of different samples and the ultimate chemical composition. It is very well known among foundrymen that irons which will give, say, ½ inch of chill, and are therefore approximately the same in chemical composition, are very far apart many times in their physical properties. The foundryman's tests for strength are, of course, crude, and the composition as determined by the chilling power is not definite, but when two different irons which will give nearly the same chill under the same circumstances differ in physical properties so widely, as is revealed by the ordinary method of testing pigs in the yard, even the most stupid observer cannot fail to recognize the difference. We ourselves have seen pigs of approximately the same size and giving approximately the same chill, from different piles of iron, one of which would break when dropped from the hight of the shoulders across an ordinary breaking block, while the others would require to be thrown with full force across the same breaking block three or four times before suffering fracture. To such an extent is this difference between the physical properties and the ultimate chemical analysis of pig irons that many intelligent foundrymen do not hesitate to say that the chemistry of pig irons is valueless, at least for indicating anything in regard to strength.

In our work on pig irons, in connection with the regular work of the Pennsylvania Railroad laboratory, we have run across the above peculiarity many times, not only in the pig metal but also in the foundry product, and not a little study has been devoted to trying to solve the problem which has thus presented itself. With a firm belief that when the chemistry of pig iron is completely understood it will prove a valuable assistance to the foundryman in his work, we have made many experiments trying to get a clew and an explanation of the puzzle. With a hope that the work already done may serve as an entering wedge and stimulate others to take up this interesting problem, we present herewith the results of some of our experiments.

As showing how completely the ordinary ultimate chemical analysis of cast metal fails to explain or even agree with the ordinary conceptions in regard to the relation between the chemistry and physical properties, we subjoin the analyses of two cast-iron wheels. Both wheels were of approximately the same weight, both were cast in the same kind of mold, and, so far as could be judged by the condition of the wheels, both were poured at approximately the same temperature. One of the wheels had been in service, the other had not. One of the wheels, which we will call the good one, which had not been in service, required 150 blows with a 25 pound sledge to break a piece out. The other had been in service, and required eight blows with the same sledge to break a piece out. We are well aware that the method of testing the strength of cast metals by sledging is not definite, but it is a practice very common at foundries, and, while it is impossible to draw fine distinctions, wide differences are as readily indicated in this way as in any other. One point further: hundreds of tests at the Altoona Wheel Foundry indicate that the service of a wheel makes no practical difference in the number of blows required to break a piece out, and we think it fair to suppose that the poor wheel did not suffer in this respect, therefore, from its service. A cracked wheel betrays itself with the first blow by the sound, and the poor wheel in this case was not cracked. The following are the analyses:

	Good wheel. Per cent.	Poor wheel. Per cent.
Total carbon	3.84	3.52
Graphite	3.30	2.36
Combined carbon	0.54	1.17
Silicon	0.59	0.65
Phosphorus	0.43	0.52
Manganese	0.13	0.12
Sulphur	0.12	0.19

As will be observed from above analyses, the total carbon is 0.31 per cent. different, the larger amount being in the good wheel. The total silicon is only 0.04 per cent. different, the larger amount being in the good wheel. The phosphorus is 0.09 per cent. different, the larger amount being in the poor wheel. The manganese differs only 0.01 per cent., the larger amount being in the good wheel. The sulphur is 0.07 per cent. different, the larger amount being in the poor wheel.

The most remarkable difference is in the graphite and combined carbon, which, of course, vary inversely with each other—that is, in the same wheel the higher the combined carbon the lower the graphite, and *vice versa*—but, to our astonishment, perhaps the highest combined carbon is in the poor wheel, whereas, with the ordinary conception of combined carbon, we expect greater strength to accompany the higher combined carbon. Perhaps, however, the most remarkable peculiarity of the whole subject is that with two pieces of cast metal treated approximately alike, poured at approximately the same temperature, and cooled at approximately the same rate, with very slight differences in the total amounts of the other constituents, the combined carbon should be so extremely wide apart. No one can fail to be struck, we think, with this remarkable difference—0.54 per cent. in the good wheel and 1.17 per cent. in the poor wheel of combined carbon—and no one can fail to ask themselves, How does it happen under the circumstances that the amounts of combined carbon in these two wheels are so different? Evidently some causes as yet unexplained determine the larger amount of

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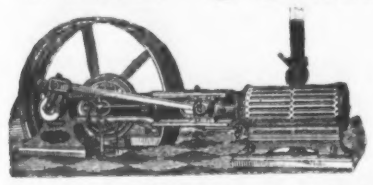

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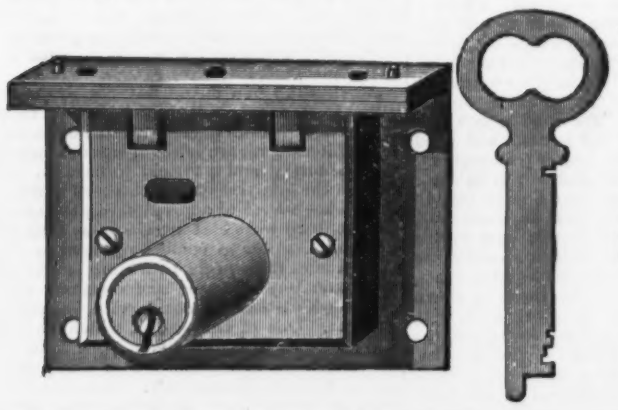

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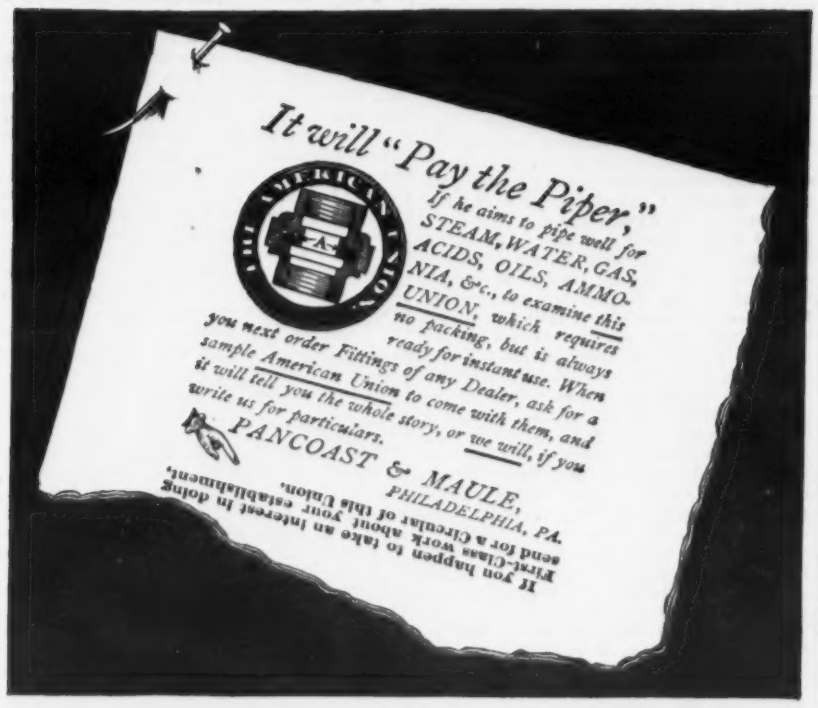
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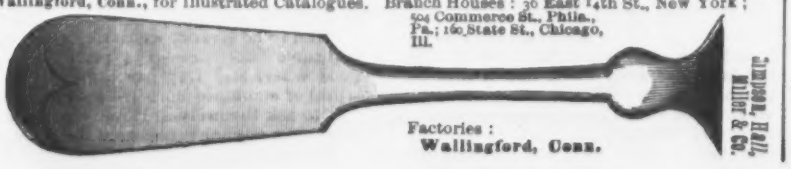

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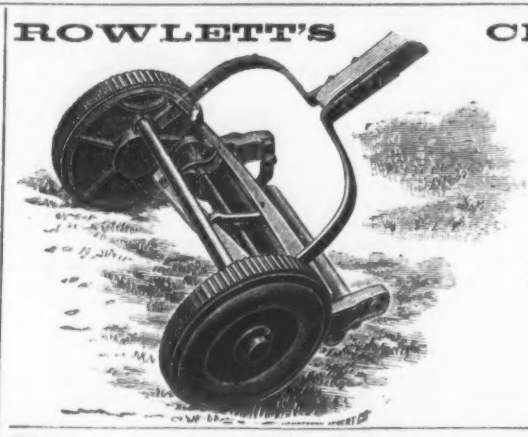

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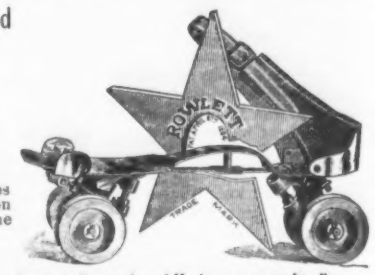

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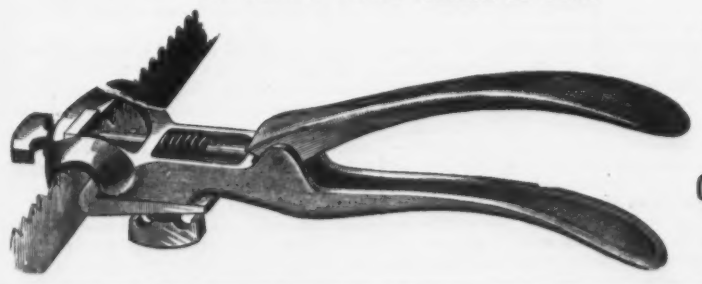

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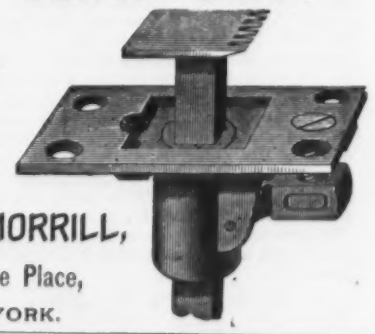

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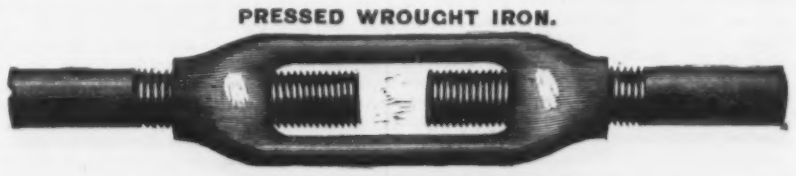

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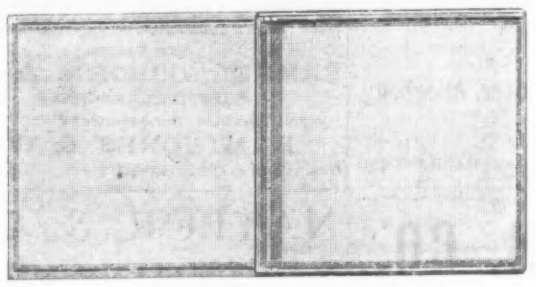

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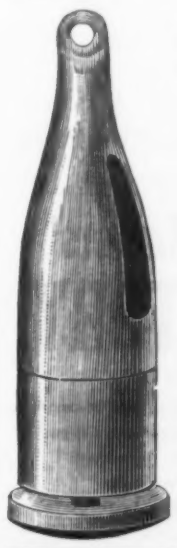

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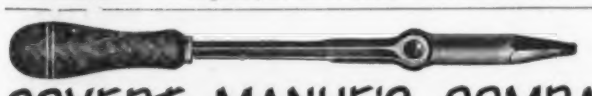

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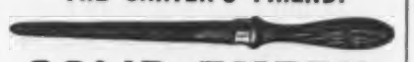

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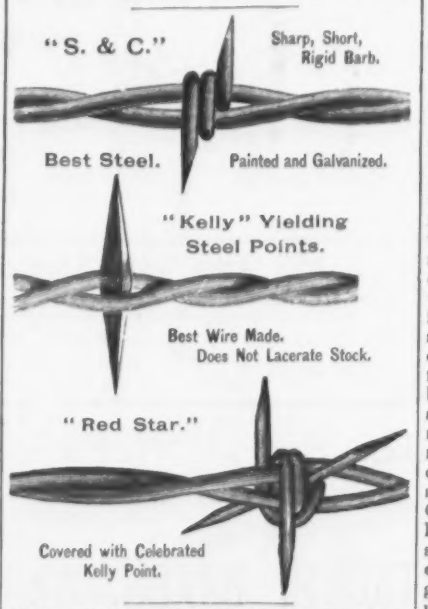

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combined carbon in the poor wheel, and also, so far as the indications of the ultimate analysis goes, the very great difference in strength of these two wheels is in some way connected with this difference in combined carbon. In other words, there is not sufficient difference in any of the other constituents to account for it. We are confident no one accustomed to working on pig irons would say that 0.09 per cent. difierence in phosphorus in a total of 0.52 per cent. would make so great a difference in strength.

We have made a very large number of experiments with these two wheels and upon other metal, including pig irons, and we must frankly confess that we have not yet succeeded in finding anything that is completely satisfactory to us as our explanation of this puzzle, nor does our reading or study of the literature on the subject throw much light upon it. What follows, therefore, must be regarded more as a record of experimentation than as mature conclusion. The field opened is apparently broad, and there is very much need of work in this direction, and the principal object of this paper is to 'stimulate inquiry and get other workers into the field.

We find by treating fine borings with a dilute solution of hydrocloric acid—about 2.50 per cent. hydrochloric acid—that a part of the metal goes into solution and a part remains behind. In the two wheels above referred to a larger percentage of residue is left in the poor wheel than in the good one. We have not followed out each of the elements completely yet, but as far as we have gone we find as follows: A large portion of the metallic iron goes into solution, all the manganese goes into solution and a portion of the phosphorus disappears and a portion of it stays with the residues. The sulphur we have not followed out completely, but a portion of it, at least, disappears. The silicon apparently all goes into solution, except, perchance, such as may be in the metal as slag. In working on other samples we have found the silicon in the residue, however, excessively small, and conclude, therefore, the amount of slag in pig metal is slight. As near as we can determine with the work we have already done, the residues consist in part of phosphide of iron, graphite and separated carbon set free by the dilute acid. These in amount do not differ widely in the two wheels. A direct determination of the phosphorus in the residue from the good and poor wheels showed in the good wheel 0.30 per cent., and in the poor wheel 0.32 per cent. Also there are strong indications that all the carbon, or practically all the carbon, remains in the residue.

In addition to the phosphide of iron and the carbon, we find in the residue what is apparently a compound of iron and carbon, and may perhaps best be called carbide of iron. The amount of this carbide of iron is different in the two wheels, being by far the greatest in the poor wheel. This carbide is gray in color, and apparently granular in structure. It seems to exist in the cast metal as little granules breaking up the continuity of the metal. We have not yet succeeded in determining the composition of this carbide of iron, nor have we yet succeeded in finding methods that would enable us to distinguish between the amount of carbon in this carbide and the graphite and the carbon, if any, set free by the dilute acid. There seem to be indications of two things: 1. That the carbon in pig irons exists in three forms, namely, as graphite, as carbide of iron, and possibly as combined with the iron in the same way that it is combined with the iron in steel, a form which we may venture to call "strength carbon." 2. There are indications that the carbide of iron before referred to is the principal cause of the great difference in strength between the good and poor wheels.

If on more mature study these two statements should prove to be correct, it would seem that the constitutions of pig iron—and, in fact, of cast iron in general—would not be very difficult to explain. The iron might be regarded as made up of strength producers and weakeners, the strength producers forming the framework of the mass of metal, and the weakeners being interspersed through the mass in a more or less granular or crystalline form and interfering with its continuity. The metallic iron, the metallic manganese, the silicon, perhaps, and the strength carbon, may be regarded as the strength producers, while the graphite, the phosphide of iron, the sulphide of iron and the carbide of iron, together with the slag and oxides, if any are present, might be regarded as the weakeners. It is not difficult to conceive, we think, that any granular body, be it a grain of sand, a grain of graphite, a grain of crystallized phosphide of iron or sulphide of iron, or a granule of carbide of iron occurring in the mass of either a piece of steel, a piece of wrought iron, if you choose, or in an alloy composed of metallic iron, manganese, silicon and carbon, would by its presence interfere with the continuity of the metal and diminish its strength. If, in addition to the graphite, the phosphide of iron and the sulphide of iron, which have for a long time been known to be present in pig irons to a limited extent, it should be found that a granular carbide of iron is also a constituent, we cannot help thinking this same carbide will throw much light on the very wide difference in different samples of cast iron. We have treated a large number of samples both of pig and cast metal with a dilute acid as before described, and we find this gray granular carbide, so far as can be determined by the eye, always present, and always larger in amount the poorer the metal. As previously stated, however, the methods for determining the amount of this carbide and the amount of graphite and strength carbon have yet to be worked out. Of the existence of the carbide there seems little doubt. Duplicate tests on the same sample, with exposure to the acid for different periods of time from 4 to 24 hours, give approximately the same total residue unacted on. In other words, there is strong evidence of the existence of a compound of iron and carbon which is insoluble in 2.50 per cent. hydrochloric acid.

There are very many interesting questions which might be asked, and undoubtedly will occur to all. Answers to these questions will have to be obtained by further study. The most important one, perhaps, is, Why does this carbide form in certain irons and not in others? There are indications that it is characteristic of repeated meltings in the cupola, and there are also indications that the presence of basic slag prevents its formation.

It is earnestly hoped that deep study will be put on this interesting problem. The commercial results connected with it are something enormous. Some furnaces uniformly make strong irons, others uniformly weak ones. Is it not possible that a change in practice which would diminish the amount of carbide of iron would change the weak iron to a strong one; also, as is well known, scrap can only be used to a limited extent in foundries. If we knew how to prevent the formation of this granular carbide of iron, is it not possible that scrap could be used to a very much greater extent than at present? We are confident that the man or men who first explore this field and give us a complete understanding of the constitution of pig iron, as well as a method of controlling its composition, will certainly cause iron metallurgy to take an enormous stride forward.

This was followed by a paper on the "Microscopical Structure of Car Wheel Iron," by Mr. F. L. Garrison, of Philadelphia. Mr. Garrison's paper was in continuation of Dr. Dudley's, and was illustrated by microscopical photographs of the iron thrown upon a screen by the use of a lantern. This paper would require the reproduction of the microscopical photographs.

Unhealthy Occupations.

Referring to our recent article on "Dust in the Workshop," we find some interesting matter in a paper read a few months ago, before the American Public Health Association, by Dr. C. W. Chancellor. Nearly all trades and manufacturing processes are attended by the evolution of dust or of volatile particles more or less considerable and hurtful. Persons habitually breathing a dust-laden atmosphere of this kind acquire a liability to diseases of various sorts; but, as the inhaled dust is necessarily in every instance brought into contact with the lungs, the pulmonary organs chiefly suffer in the end.

Were we to enter one of the busy workshops of the steel-workers, remarks Doctor Chancellor, and for a time, amid the turmoil of machinery, attempt to breathe its stifling atmosphere, charged with minutely-pulverized dust emitted by hundreds of wheels, we would have a practical experience of the causes why few, if even one, of all the workers there will ever reach their fortieth year. The average duration of life among the dry grinders of forks is 29 years; of razor grinders, 31 years; edge-tool grinders, 32 years; knife and file grinders, 35 years, and saw and sickle grinders, 38 years. The cause of this excessive mortality is apparent. In every 100 sick among the needle-makers 70 are consumptive; among the file-makers, 62 in 100 are consumptive, and, taking the steel grinders all round, rather over 40 in the 100 are consumptive. Consumption among workers in copper and lead is the predominant disease, and in every 100 lithographers, for instance—workers in copper—one-half nearly are consumptive. But notoriously overtopping all the other dusty occupations in their efforts upon life and health are those of the grindstone-makers, flint-cutters and glass-polishers. The condition under which their work is carried on is in the highest degree favorable to the production of pulmonary diseases. They work in an atmosphere loaded with sharp spiculæ, which lacerate the lungs and quickly induce consumptive disease. Every grindstone-maker is cut down by it at or soon after the age of 24. Hardly one escapes. The flint-cutter and glass-polisher have each 80 deaths per 100 sick of consumption, and their average life is under 30 years. Again, the stone-cutters terminate their average life at the age of 36—36 in every 100 sick being consumptive.

The occupations which are productive of vegetable dust include a somewhat promiscuous and apparently incongruous variety of workers. Among these we have the cigar-maker and the tobacco and snuff worker. Although they enjoy an average life of 55 years, they nevertheless head the list with 36 cases of consumption in every 100. Among the different classes of workers in textile fabrics, the weavers engaged in the cotton, flax and hemp branches are unquestionably the chief sufferers. It is stated on the best authority that three-fifths of the flax-mill workers of Belfast, Ireland—the chief center of that textile manufacture—are consumptive. In other words, 60 in every 100 are said to die of that disease. The average life of the weavers of this restricted class is 44 years, while that of weavers in general is about 57. Carpenters, joiners and cabinet-makers are affected by their dusty occupations, each group having 14 consumptive cases in every 100. It is generally believed that the coal-miner's and coal-heaver's occupation is one most highly productive of pulmonary disease, and on that supposition, when consumption occurs in this class, it is designated "miner's phthisis." Dr. Smart says that in his experience—hospital and otherwise—he had not been able to confirm this prevalent belief, nor does he believe it to be well founded. In every case of so-called "miner's phthisis" which he had seen there was a distinct family history of the disease. It would seem, therefore, that a man predisposed hereditarily to consumption develops it not more readily as a coal-miner or coal-heaver than in any other employment. The black expectoration seen in miner's consumption proves no more than that the coal-dust has reached the lungs—certainly not that it is the cause of the disease. Coal-dust—or, to call it by its proper name, carbon—from its highly antiseptic properties, acts as an excellent protection to the pulmonary organs. Dr. Smart further states that among 1200 sick miners only one case of consumption was noticed.

The effect of breathing animal dusts is shown in the following statistics: The percentage of consumption among brush-makers is 49.1; hair-dressers, 32.1; skinners, 23.2; tanners, 16.2; hatters, 15.5; button-makers, 15.0; harness-makers, 12.8; cloth-makers, 10 per cent.

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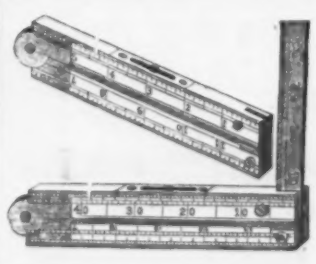

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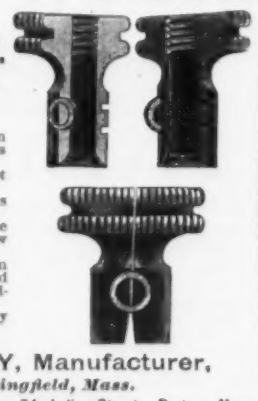

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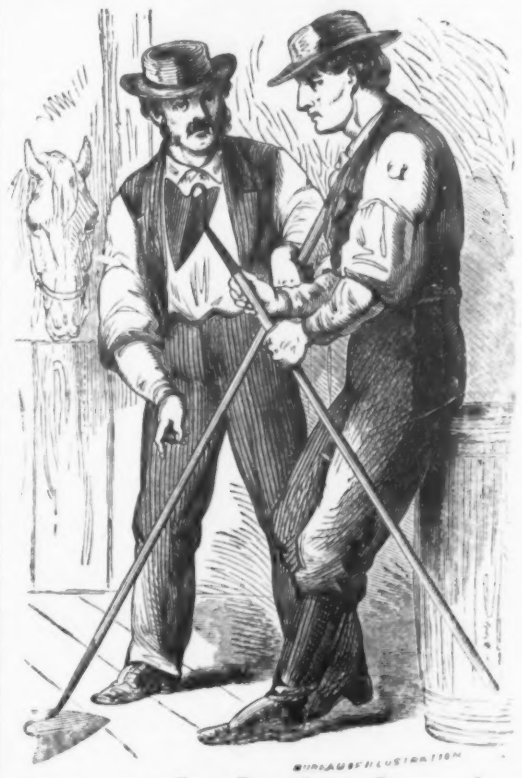

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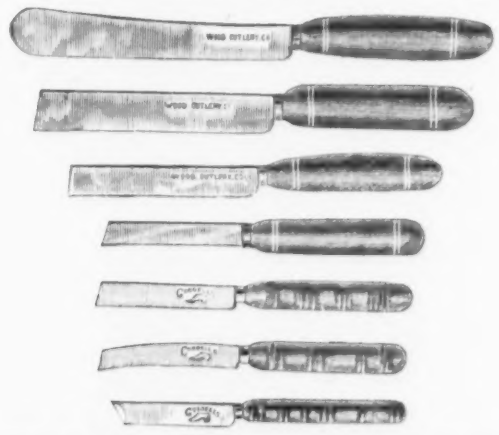

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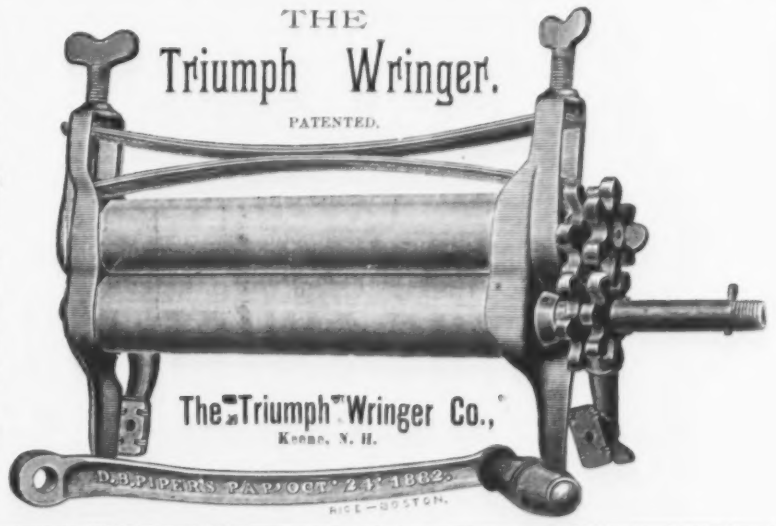

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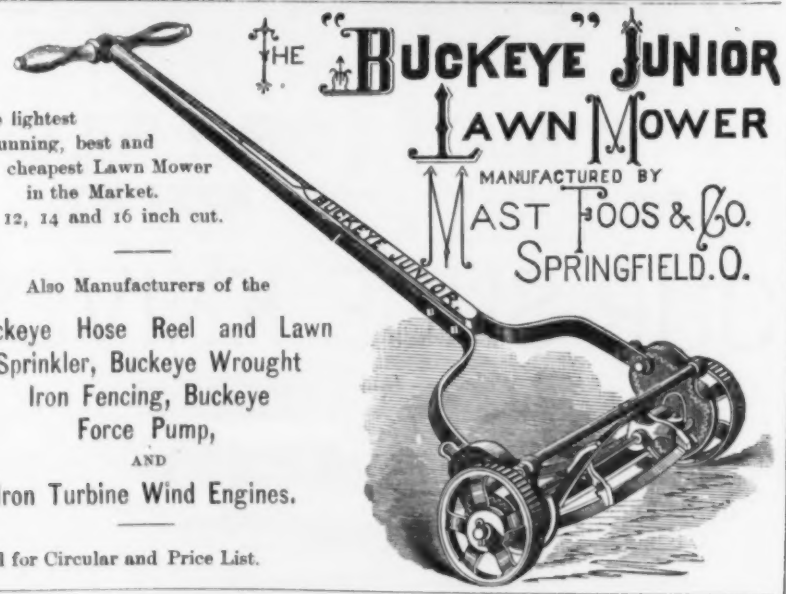

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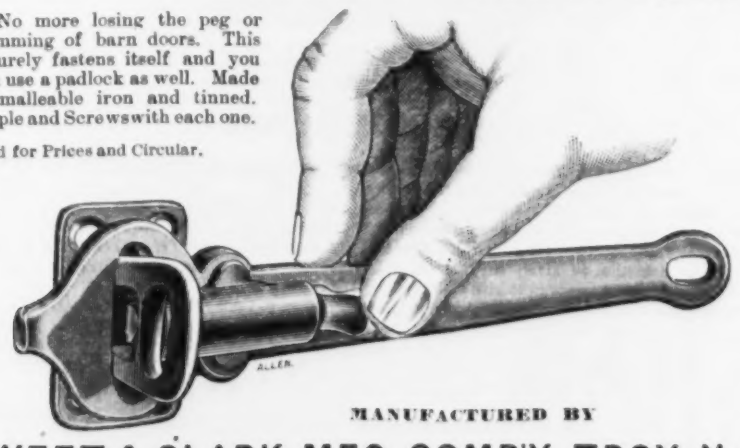

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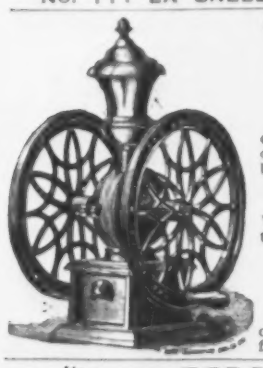

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WORKS, Ellerslie, Allegheny Co., Md.

MAIN OFFICE, Cumberland, Md., P. O. Box 93.

BRANCH OFFICE, Pittsburgh, Pa., P. O. Box 373.

S. M. Hamilton & Co., Agents, Baltimore, Md.

UNION MINING COMPANY.

MOUNT SAVAGE FIRE BRICK.

EDWARD J. ETTING, Agent

Eastern Penna., West New Jersey and Delaware.

222 South Third St., Philadelphia, Pa.

BIRMINGHAM FIRE BRICK WORKS.

All dimensions constantly on hand. **Fire Bricks, Fire Shapes, Kaolin, Fire Brick Cement, Fire Clay, Fire Sand** for Furnaces; Coke Ovens, Stoves, Boilers, and for the Southern Trade generally.

Birmingham, Ala.

New Jersey Fire Clays.

Paper, Ball, Retort, Glass Pot, Stove Lining and Foundry Clays. Foundry and Fire Sand and Kaolin.

Orders by Car or Boat Loads promptly filled.
CHAS. S. EDGAR, Metuchen, N. J.

AIKIN & LIGHTON,

Iron City Foundry and Machine Works,

SOLE MANUFACTURERS OF

AIKIN'S IMPROVED PATENTED

SAND MOULDING MACHINE

BIRMINGHAM, ALABAMA.

CORRESPONDENCE SOLICITED.

Self-Binders for The Iron Age.

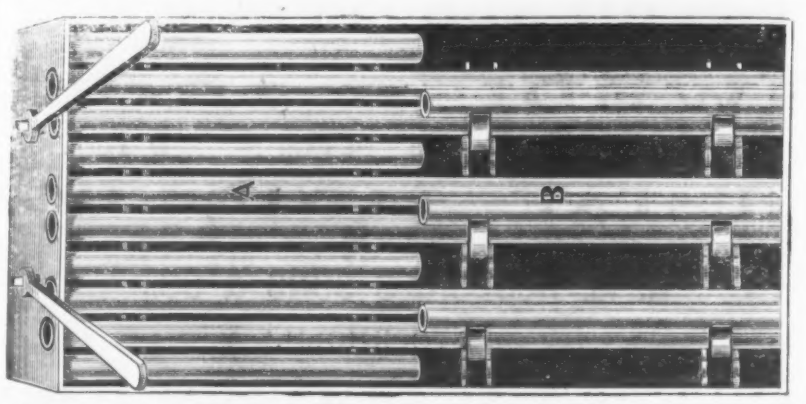
We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to

DAVID WILLIAMS,
66 and 68 Duane Street, New York.

VICTORY AT LAST

—IN—

LOCOMOTIVE GRATES.



The above cut shows Grate shut in section A, and open in section B. The Levers shown in cut extend up into the Cab of Engine, and the remarkable fact remains that the Grate can be cleaned while running at the highest rate of speed, and be kept perfectly clear of clinkers. The Long Bars in Grate are Water Bars, the Short ones Rocking Bars. Both being hollow, as a natural consequence cannot be warped or burned. We claim a saving in fuel of 35% not considering the great saving on the Flues and Engine proper. This Grate can be used with or without Water Bars on Locomotives, likewise on Stationery Engines, Furnaces and Ranges of all kinds, and is now in preferable use on the Lehigh Valley R. R., and unreservedly endorsed by them. This Grate will pay for itself in 30 days, and last for years. It is the only Grate that will burn with equal success Hard or Soft Coal or Culm. We desire live men in every State, to form syndicates all over the United States. Full information will be furnished by applying to

THE AMERICAN WATER BAR GRATE CO.,

1123 Arch Street, Philadelphia, Pa.

Send for endorsements of Locomotive Engineers.

MOORE MANUF'G CO.,

163 & 165 Lake Street,

CHICAGO,

Manufacturers of

"NOVELTY"

Tackle Blocks,

Wrought Iron Hooks, Malleable Iron Shells, Steel Pins, Steel Roller Bushings.

Four sizes now ready with single, double or triple sheaves for ½, ¾, 1 and 1¼ inch rope.

The Finest Blocks in the Market at a Reasonable Price.

AMERICAN CUTLERY CO.,

MANUFACTURERS OF

TABLE CUTLERY,

BUTCHER, COOK AND CARVING KNIVES.

177 to 191 Mather Street, - - - - - CHICAGO.

WRITE FOR CATALOGUES.

Hyde's Improved Mitre Box.

SIMPLE, ACCURATE, DURABLE

and a low-priced Mitre Box. It is provided with a Back Saw, and warranted perfect in every respect. It will cut a molding 4 in. deep 4 in. wide. Attention is called to the stop-gauge for sawing tenons, which is set by a single thumb-screw, the saw-guide holding the saw parallel with the base at all times.

PRICES:

20-in. Saw .....$5.75.
22-in. " ..... 6.00.

NICHOLS, BELLAMY & CO., 657 Washington Street, BOSTON, MASS.

HANDLES FOR MANUFACTURERS.

From Selected Stock, Thoroughly Seasoned, Well Made.

Orders solicited from close buyers who want good work.

RIPLEY MANUFACTURING CO.,

Unionville, Conn.,

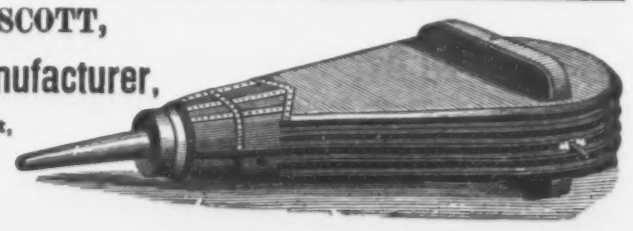
Manufacturers of

"Common Sense" Mouse Traps, Mallets, Porcelain-Lined Lemon Squeezers, Boot Jacks, Faucets and Hardware.

GEO. M. SCOTT,

Bellows Manufacturer,

Johnson Street,
Cor. 22d St.,
CHICAGO, ILL.



PHILADELPHIA.

Lloyd & Supplee Hardware Co.

Terms, 30 days. For 60 or 90 days, interest added at 8 per cent. per annum.

Anvils.
Peter Wright's, ℔ ..... 9¾ @ 10¢
Trenton ..... 9½¢
Eagle Anvils, American, 10¢ ..... dis. 20 %

Apple Parers.
Penn Apple Parers ..... $5.00 net
White Mountain 5.00
Lots of 10 to 25 dozen, special prices.

Axes.
Hunt's Kentucky and Yankee, ℔ doz. net $7.00
William Mann, ℔ doz. net 7.00
Favorite ℔ doz. net 6.00
Beveled Axes ..... add 50¢
Double Bit Axes, net $12.00

Augers and Auger Bits.—New List January 7 1880.
Snell's Augers and Bits ..... dis. 60@60&5 %
New Haven Copper Company ..... dis. 60&10&5 %
Benjamin Pierce Auger Bits ..... dis. 40 %
Jennings' Auger Bits, new list Jan. 1, 1884 ..... dis. 25 %
Cook's Auger Bits and Augers ..... dis 55 %
Snell's Ship Augers ..... dis 15 @ 20 %
Watrous' Ship Augers ..... dis. 15 @ 20 %
Bonney's Pat. Hol. Augers, list $48 ℔ doz ..... dis. 40&10 %
Stearns' Pat. Hol. Augers, list $48 ℔ doz ..... dis. 20&10 %

Balances.
Light and Common ..... dis. 50 %

Bells.
Bevin Bros. Mfg. Co. Light Hand Bells ..... dis. 75&10@80 %
Light Hand Bells ..... 80&5 %
Swiss Pattern Hand Bells ..... 60 %
Connell's Door Bells ..... dis. 20&10 %
Gt. Western & Kentucky Cow, new list ..... dis. 70 %

Boring Machines
Upright, witnout Augers ..... List, $5.50 }
Angular, without Augers ..... List, 6.75 } ..... dis. 50 %

Bolts.—Eastern Carriage Bolts, new list, June 10, 1884 ..... dis 75&10&5@80 %
Phila. Carriage Bolts new list ..... dis 75&10@75&10&5 %
Stanley, Wrought Shutter ..... dis. 60&10 %

Braces.—Barber's Improved ..... dis 50 %
Barber's Old Style ..... 50&10 %
Backus, Polished ..... dis 60@60&10 %
Backus, Nickeled ..... dis. 50&10@60 %
Spofford ..... dis 50&5@50&10 %
American Ball ..... dis. 55&10 %
Amidon Improved ..... dis. 60@60&10&5 %
Amidon Corner Brace ..... dis. 40@40&10 %

Butts.
Cast Fast Joint, Narrow ..... dis.60&10@60&10&10 %
Cast Fast Joint, Broad ..... dis. 60&10 %
Cast Loose Joint, Narrow ..... dis. 70&10@70&10&5 %
Cast Loose Joint, Broad ..... dis. 70&10@70&10&5 %
Cast Acorn, Loose Pin ..... dis. 70&10@70&10&5 %
Cast Acorn, Japanned ..... dis. 70&10@70&10&5 %
Cast Mayer's Loose Joint ..... dis. 70&10@70&10&5 %
Wrought Loose Pin ..... dis. 60&10&10@60&10&10&5 %
Wrought Table Hinges and Back Flaps ..... dis. 60&10 @ 60&10&10 %
Wrought Loose Joint ..... dis. 60&10&10@60&10&10&5 %
Wrought Narrow Fast ..... dis. 60&10 @ 60&10&10 %

Blind Butts.
Parker ..... dis. 75&2 %
Clark ..... dis. 80 %
Shepard ..... dis. 75&10&5 @ 80 %
Lull & Porter ..... dis. 80&10 %
Huffer's ..... dis. 50 %

Casters.—Bed (new list July 1, 1880) Plate ..... dis 60 %

Chains.—German Halter and Coil, list June, 1884 ..... dis. 55 @ 55&5 %
Galvanized Pump ..... ℔ ℔ 5¼@6¢
Best Proof Coil Chain—English.

℔ ℔	9/16	5/8	11/16	3/4	13/16	7/8	15/16
	3-16	1/4	5-16	3/8	7-16	1/2	

Chisels.—Socket Framing ..... dis 75&10@75&10&5 %
Socket Firmer ..... dis 75&10@75&10&5 %
Butcher's ..... $5.00@$5.25 to £ gold

Coffee Mills.—Box and Side (new list Jan. 1, 1880 ..... dis 45&10 %
Enterprise ..... dis 20&10@30 %

Cutlery.—Walden Pocket ..... new list net
Pennsylvania Knife Co. ..... new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Door Hangers.—Cronk Barn Door Hangers ... No. 4, $12.00; No. 5, $14.00; No. 6, $18.,00 ..... dis. 50&5&50&10 %
American Parlor Door Hanger ..... $6.00; dis 20&10 %

Drawing Knives.
Hart Mfg. Co.'s ..... dis. 75&10&5 %
Adjustable Handle ..... dis 20@25 %

Fry Pans.
Tinned ..... dis 45 %
℔ doz. $3.50 4.00 4.50 5.00 5.50 6.50 7.50 9.00 10.00
No. 0 1 2 3 4 5 6 7 8
Burnished ..... dis 70 %
℔ doz. $3.00 3.75 4.25 4.75 5.25 6.00 7.00 8.00 9.00
No. 0 1 2 3 4 5 6 8

Files.
Nicholson ..... dis 55@55&5 %
Disston ..... dis 55@55&5 %
Butcher ..... 60&5@60&10 %
Crown and Arrow ..... 60&5@60&10 %

Fluting Machines.
Eagle—3½ in. roll ..... each, $2.15 }
Eagle—5½ in. roll ..... each, 2.85 } dis 35 %
Crown—4½ in. roll ..... each, 3.50 }
Crown—6 in. roll ..... each, 4.00 } dis 35 %
Crown—8 in. roll ..... each, 6.50 }
Geneva Fluter ..... dis 25 %
Favorite com. Fluter and Sad Iron ..... ℔ doz., $10.50 net

Hammers.
Yerkes & Plumb's, new list ..... dis 40&5 %
Maydole Hammers, new list ..... dis 25@25&10 %
Howell A. E. Nail Hammers ..... ℔ doz., net $3.75

Handles.
Disston Loop Handles Cross-Cut ..... 33¢ pair net
Boynton Loop Handles Cross-Cut ..... 20¢ pair net

Hatchets.
Yerkes & Plumb, new list ..... dis 40&10 %
Hunt ..... dis 40 %

Hay and Straw Knives.
Lightning ..... ℔ doz., $18.00 dis. 20 %
Electric ..... ℔ doz., $12.00 net
Wadsworth ..... ℔ doz., net dis 35@5@40 %
Walton Straw Knives ..... ℔ doz., net 17.00
Gem Hay Knife ..... ℔ doz $18; dis 20 %

Hinges.
Strap and T ..... dis 65&5 %

Horse Nails.

	Nos. 5	6	7	8	9	10	
Globe	26	23	21	20	19	18	dis 10&5&5 %
Ausable	30	27	25	24	23	22	dis 25&10 %
" Pol'ed and P't'd & Blued & P't'd.	31	28	26	25	24	23	dis 25&10 %
Clinton		23	21	20	19	18	dis 25&10 %
" Pol'ed & P't'd.		24	22	21	20	19	dis 25&10 %
Saranac	26	23	21	20	19	18	dis 25@30 %

Locks and Knobs.
Branford Locks ..... dis 50&2 %
Parker's Cabinet ..... dis 40&2 %
American Padlocks ..... dis 70@70&10 %
Scandinavian Padlocks ..... dis 50 %
℔ doz. ..... $5.00 5.50 6.50 7.50 8.50 10.00 12.50 } dis 60 %
No. ..... 57 58 59 60 61 62 63 }
℔ doz. ..... $18.00 26.00 33.00 } dis 60 %
No. ..... 64 65 66 }

Lanterns.
Buckeye ..... large list, net; small list, net
Tubular. No. 0, $6.75@7.00; No. 1, $8.25@8.50 ℔ doz. net
Guards 40¢ extra.

Lawn Mowers.—Pennsylvania ..... }
Philadelphia ..... }
Excelsior ..... } dis 50 %
Continental ..... }
Quaker City ..... }

Lawn and Garden Pumps.
Holland Patent ..... list, $5.00, dis 10 %

Mattocks.
Long and Short Cutter ..... new list, 60&10 %
Pennsylvania Pattern ..... dis 60& 10 %

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets ..... dis. 20&10 %
Stebbins' Gates ..... dis. 70&10 %
Lincoln's Gates ..... dis. 70&10 %
Landers, Frary & Clark's Petroleum ..... dis 33½&10 %
Brass Liquor Cocks new list Jan. 1, 1880 ..... dis. 65&5 %
Cork Lined Cocks ..... dis. 70 %

Meat Cutters.
Dixon's ..... dis. 40 %
Woodruff ..... dis. 40 %
Stowe ..... dis. 40 %
Hale's ..... new list, dis. 60&10&10 %
American ..... dis 35 %
Stuffers ..... dis. 40 %
Enterprise Stuffers ..... dis. 20&10 %

Planes.—Sandusky Tool Co ..... dis. 20&2 %
Ogonts ..... dis. 25&2 %
Ohio and Auburn ..... dis. 20&2 %
Bailey (S. R. & L. Co.) ..... dis. 20&10 %

Plane Irons.—Ohio Tool Co ..... dis. 20&10 %
Butcher's ..... $5.00 @ 5.25 to £

Plumbs and Levels.
Stanley's Adjustable ..... dis. 70&10 %
Stanley's Non-Adjustable ..... dis. 70&10 %

Picks.—New list ..... 60 %

Razor Strops.
Lamont Combination ..... ℔ doz. $4.00
Lamont Combination ..... 1 gross lots $42.00
Imitation Emerson ..... ℔ doz. $2.00, 70&10&10 %

Rules.—Stanley Boxwood ..... dis. 80&5@80&10 %
Stanley Ivory ..... dis. 55 @55&5&10 %

Steelyards.—Hart's Pattern dis ..... 40&10@50 %

Per doz.	$14.50	17.75	21.00	26.50	31.00	35.50
Lbs.	50	100	150	200	250	300

American Pattern ..... dis. 40&10@50 %

Per doz.	$8.00	10.25	13.75	15.60	16.75	19.50
Lbs.	50	100	150	200	250	300

Scale Beams ..... 60&5@60&10%
Custers ..... 25 %

Squares.
Steel and Iron ..... dis. 60&10 %; full cases dis.
..... 70&10@70&10&10 %
Try Squares, Stanley ..... dis 60&10 %
Disston's Try Squares ..... dis 45&10 %

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened ..... ℔ doz $7.00 net
Clipper No. 10, Bronzed Blade, Boxed and Sharpened ..... ℔ doz $6.70 net

Saws.—Disston's Hand, Panel and Rip ..... dis 20&10 %
Disston's Circular ..... dis 45&10 %
Cross-Cut No. 2, Plain Tooth ..... dis 45&10 %
Cross-Cut Patent Tooth ..... dis 45&10 %
Cross-Cut Champion Tooth ..... dis 45&10 %

Shovels and Spades.
Oliver Ames & Sons, new list ..... dis 20 %
Griffiths ..... dis 50&10@60 %
Rowland ..... dis 60@60&5 %

Sad Irons.—4 to 10 ℔ ..... ℔ ℔ 2.35@2.50¢
Mrs. Potts' Patent ..... dis 35@40 %

Stone.
Washita Extra ..... ℔ ℔ 30¢
Washita No. 1 ..... ℔ ℔ 25¢
Washita No. 2 ..... ℔ ℔ 20¢
Washita Slips ..... ℔ ℔ 50¢
Washita Axe ..... ℔ ℔ 15¢
Hindostan Oil Stone No. 1 ..... ℔ ℔ 4½ ¢
Hindostan Axe Stone ..... ℔ ℔ 5¢
Hindostan Slips ..... ℔ ℔ 8¢

Screws.—Parker List.
Flat Head Iron ..... dis 83½ %
Flat Head Brass ..... dis 87½ %
Round Head Brass ..... dis 81½ %
Round Head Iron ..... dis 81½ %

Spoons.
Plated ..... dis 50&10@60 %
German Silver ..... dis 40&10@50 %
Britannia, Boardman's ..... dis 60 %
Britannia, Parker's ..... dis 60&10 %
Tinned ..... dis 10 %

Springs.—Torrey ..... dis 50 %
Gem No. 3 small Japanned ..... $2.00 }
Gem No. 2 medium Japanned ..... 2.75 } dis 50&10 %
Coil No. 10 ℔ gross net ..... $5.50@6.00
Other Standard Springs ..... dis 50&10@60 %
Warner Door Springs, ℔ doz. $2.50 ..... dis 40&10 %
Standard Spring Hinges—
Single No. 0, ℔ doz. net ..... $1.10@1.25
Single No. 1, ℔ doz. net ..... 1.25@1.50
Other Standard Spring Hinges ..... dis 25&10@40 %

Stocks and Dies. ..... dis 15&10@25 %

Stove Polish.—Gem ..... ℔ gross, $4.50, dis 12½ %
Dixon ..... 6.00, dis 10 %
Fire Fly ..... $3.00 gross. net

Tacks. ..... Combination discounts
Shoe Nails—4-8, and over, 5½¢ ..... } 10 %
Shoe Nails—3½-8, and under 7¢ ..... }
Double Pointed Tacks ..... dis 80 %

Traps.
Genuine Oneida—Newhouse ..... dis 35 %
Im. Oneidas—Newhouse list. First qual. dis 60&10&10 %

Vises.—Solid Box. Trenton new list ..... dis 50&10@60 %

Wrenches.—Agricultural ..... dis 75&10&5 %
Coes' Genuine ..... dis 60&3 %
Coes' Mechanics' ..... dis 60&10&3 %
Coes' Mechanics,' Mall. Bar ..... dis 80 @ 80&5 %

Wire.
Bright or Annealed, No. 0 to 18 ..... dis 65&5 %
Bright or Annealed, No. 19 to 26 ..... dis 70 %
Bright or Annealed, No. 27 to 36 ..... dis 70 %
Coppered, 0 to 18 ..... dis 65 %
Tinned Broom Wire ..... dis 65 %
Galvanized Barb Wire ..... 5½¢
Painted Barb Wire ..... 4½¢
Galvanized, No. 7 to 18 ... Market List, dis ..... 50 %

Wringers.
Peerless No. 2½ ..... $30.00 }
Peerless No. 2 ..... 33.00 }
Universal No. 2½ ..... 30.00 } dozen lots
Universal No. 2 ..... 33.00 } $3.00 @
Novelty No. 2, for common tubs ... 30.00 } 4 00 off.
Novelty No. 3, " " ... 34.50 }
Excelsior E, for stationary tubs ... 39.00 }
Excelsior ℔ " " ... 43.50 }

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 90 days, with current rate of exchange on New York, or a discount of 2 ℔ cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

The following are card rates.

Flat Bar.

1¼ to 4 by ⅜ to 1 inch ..... 2.0¢
4¼ to 6 by ⅜ to 1 " ..... 2.1¢
1¾ to 6 by 1⅛ to 1½ " ..... 2.4¢
1¼ and 1¾ by ⅜ to ⅝ " ..... 2.1¢
1 and 1¾ by ⅜ to ⅝ " ..... 2.2¢
⅝, ¾ and ⅞ by ⅜ to ⅝ inch ..... 2.4¢

Rounds and Squares.

1 to 1¾	2.0¢	⅜ to 9-16	2.2¢
2 to 2⅜	2.2¢	½ to 7-16	2.4¢
2⅜ to 3¼	2.5¢	⅝	2.6¢
3⅜ to 4	3.0¢	5-16	2.8¢
4¼ to 5	3.5¢	¼	3.0¢
⅝ to ⅞	2.1¢	3-16	5.0¢

Oval Iron.

¾ to 1¼	2.4¢	⅜	2.8¢
⅝ to ⅞	2.6¢	½	3.2¢

Half Oval and Half Round.

⅞ to 1¼ inch	2.7¢	½ inch	3.5¢
⅝ to ⅞ "	3.2¢	⅝ "	5.0¢

Horse Shoe.

⅝ to 1⅛ by 5-16 to ½ inch ..... 3.0¢

Wagon Box Iron.

⅞ inch, Nos. 13 and 14 ..... 3.2¢
⅞ " " 11 and 12 ..... 3.0¢
⅝ " " 13 and 14 ..... 3.5¢
⅝ " " 11 and 12 ..... 3.3¢
⅝ " " 13 and 14 ..... 3 ½¢
⅝ " " 11 and 12 ..... 3.9¢

Heavy Bands.

3½ to 6 by ¼ and 5-16 inch ..... 2.2¢
1½ to 3¼ by ¼ and 5-16 " ..... 2.2¢
1 to 1¾ by ¼ and 5-16 " ..... 2.3¢
⅝ to 1⅛ by ¼ and 5-16 " ..... 2.5¢
⅝ and ½ by ¼ and 5-16 " ..... 3.0¢

Light Bands.

1¼ to 6 by ⅛ to 3-16 ..... 2.5¢
1¼ to 6 by Nos. 11 and 12 ..... 2.6¢
1 to 1⅝ by ⅛ to 3-16 ..... 2.6¢
1 to 1⅝ by Nos. 11 and 12 ..... 2.7¢
⅞ and 13-16 by ⅛ to 3-16 ..... 2.9¢
⅞ and 13-16 by Nos. 11 and 12 ..... 3.0¢
¾ and 11-16 by ⅛ to 3-16 ..... 3.2¢
¾ and 11-16 by Nos. 11 and 12 ..... 3.3¢
⅝ and 9-16 by ⅛ to 3-16 ..... 3.5¢
⅝ and 9-16 by Nos. 11 and 12 ..... 3.6¢
⅛ inch by ⅛ and 3-16 ..... 3 ¾¢
⅛ inch by Nos. 11 and 12 ..... 3.9¢

Hoop Iron.

1¼ to 4, Nos. 13, 14 and 15 ..... 2.8¢
1¼ to 2, Nos. 16, 17 and 18 ..... 2.9¢
1¼ to 2, No. 19 ..... 3.0¢
1¼ to 2, No. 20 ..... 3.1¢
1¼ to 2, No. 21 ..... 3.2¢
1¼ to 2, No. 22 ..... 3.3¢
15-16, 1, and 1¼, Nos. 13, 14 and 15 ..... 3.0¢
15-16, 1, and 1¼, Nos. 16, 17 and 18 ..... 3.1¢
15-16, 1, and 1¼, Nos. 19 and 20 ..... 3.2¢
15-16, 1, and 1¼, No. 21 ..... 3.3¢
15-16, 1, and 1¼, No. 22 ..... 3.4¢
⅞, Nos. 13, 14 and 15 ..... 3.2¢
⅞, Nos. 16, 17 and 18 ..... 3.3¢
⅞, Nos. 19 and 20 ..... 3.4¢
⅞, No. 21 ..... 3.5¢
⅞, No. 22 ..... 3.6¢
13-16, Nos. 13, 14 and 15 ..... 3.4¢
13-16, Nos. 16, 17 and 18 ..... 3.5¢
13-16, Nos. 19 and 20 ..... 3.6¢
13-16, No. 21 ..... 3.7¢
13-16, No. 22 ..... 3.8¢
¾, Nos. 13, 14 and 15 ..... 3.5¢
¾, Nos. 16, 17 and 18 ..... 3.6¢
¾, Nos. 19 and 20 ..... 3.7¢
¾, No. 21 ..... 3.8¢
¾, No. 22 ..... 3.9¢
11-16, Nos. 13, 14 and 15 ..... 3.7¢
11-16, Nos. 16, 17 and 18 ..... 3.8¢
11-16, Nos. 19 and 20 ..... 3.9¢
11-16, No. 21 ..... 4.0¢
11-16, No. 22 ..... 4.1¢
⅝, Nos. 13, 14 and 15 ..... 3.9¢
⅝, Nos. 16, 17 and 18 ..... 4.0¢
⅝, Nos. 19 and 20 ..... 4.1¢
⅝, No. 21 ..... 4.2¢
⅝, No. 22 ..... 4.3¢
⅝, No. 23 ..... 4.4¢
9-16, Nos. 13, 14 and 15 ..... 4.1¢
9-16, Nos. 16, 17 and 18 ..... 4.2¢
9-16, Nos. 19 and 20 ..... 4.3¢
9-16, No. 21 ..... 4.4¢
9-16, No. 22 ..... 4.5¢
9-16, No. 23 ..... 4.6¢
⅛ inch, Nos. 13, 14 and 15 ..... 4.3¢
⅛ inch, Nos. 16, 17 and 18 ..... 4.4¢
⅛ inch, Nos. 19 and 20 ..... 4.5¢
⅛ inch, No. 21 ..... 4.7¢
⅛ inch, No. 22 ..... 4.8¢
⅛ inch, No. 23 ..... 4.9¢

The prices under Hoop Iron do not apply to Cotton Ties.

1-10¢ ℔ ℔ extra will be charged for each gauge lighter than the lightest indicated.

1-10¢ ℔ ℔ extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.

1¼ to 2 in., cut to length.

9 to 11 ℔, ℔ set of 6 hoops ..... 3.0¢
8 ℔ and less than 9 ℔, ℔ set of 6 hoops ..... 3.1¢
Less than — ℔, ℔ set of 6 hoops ..... 3.2¢

Extras for Cutting to Length all Preceding Iron.

All Iron, including Tire ..... 1.10¢

Tank Iron.

No. 9 and heavier ..... 2.8¢
Plow Slabs ..... 3.0¢
Plow Wings ..... 3.3¢

Sheet Iron.

	Common.	Charcoal.	Juniata.
Nos. 10 to 14	3.0¢	4.5¢	6.0¢
Nos. 15 to 17	3.3¢	4.8¢	6.3¢
Nos. 18 to 21	3.6¢	5.1¢	6.6¢
Nos. 22 to 24	3.8¢	5.3¢	6.8¢
Nos. 25 and 26	4.0¢	5.5¢	7.0¢
No. 27	4.2¢	5.7¢	7.2¢
No. 28	4.5¢	6.1¢	7.6¢

All sheets No. 18 and lighter, over 30 inches wide, not less than 2.10¢ extra.

Wood's Patent Planished Sheet.

1st quality (A) ..... 10¢ | 2d quality (B) ..... 9¢

Galvanized C. H. B.—(Charcoal Hammered Blooms.)

Nos. 14 to 20	12¢	No. 27	15¢
Nos. 21 to 24	13¢	No. 28	16¢
Nos. 25 and 26	14¢	No. 29	18¢

57½ @ 60 % discount.

Coal Screen Iron.

1¾ by ⅝ by 5-16 ..... 2.5¢ | 1 by ⅝ by 5-16 ..... 3.0¢

Angle Iron.

2¼, 3, 3½ and 4 inch ..... 2.8¢
1½, 1¾, 2 and 2½ " ..... 2.6¢
1¼ inch ..... 2.5¢
1 " ..... 3.1¢
1¼ by 1 inch, for Plow Handles ..... 3.3¢
1½ by ¾ " " ..... 3.3¢
1⅝ by ¾ " " ..... 3.4¢

T Rail.

8 lbs. to the yard ..... 2.4¢ | 20 lbs. to the yard ..... 2.3¢
12 " " ..... 2.5¢ | 28 " " ..... 2 3¢
16 " " ..... 2.5¢ | 30 " " ..... 2.3¢

Splice Joints for 12, 16 and 20 ℔. Rail, 70¢ each; 28 and 30-℔. Rail, 40¢ each; 40-℔., 50¢ each.

3½ by ¾ and ½ Spikes for 20 and 28-℔. Rail ..... 3½¢
2½ and 3 by ⅝ " " 12 and 16-℔. " ..... 3.7¢
2½ by 5-16 " " 8-℔. Rail ..... 4.0¢

Flat Rails.—Punched and Countersunk.

1¼ to 2 by ⅛ to ⅝ inch ..... 2.5¢
1¼ by ¼ and 7-16 inch ..... 2.7¢
1¼ by ⅜, 7-16 and ½ inch ..... 3.0¢

Junieta Nail Rods ..... 6.0¢
Norway Nail Rods ..... 7.5¢
Guard Iron, ¾x⅛x⅛ and ¾x⅛x⅜ ..... 3.5¢
Guard Iron ⅝x⅜x9-16 and ⅞x⅜x⅛ ..... 3.7¢
Drag Bars ..... 2.8¢
Dropper Bars ..... 3.3¢
Cylinder and Landside Iron ..... 2.7¢
Plow Beam Iron ..... 2.5¢

Nails.

See Pittsburgh Trade Report.

Best Quality Refined Cast Steel.

Square, Flat, Octagon and Round.

⅝ to 2 inches, inclusive ..... 8¢
1-16 and 2⅛ to 3 inches ..... 9¢
¼ and 3¼ to 4 " ..... 10¢
7-32 and 4⅛ to 5 " ..... 11¢
3-16 and 5⅛ to 6 " ..... 14¢
5-32 inch ..... 18¢
⅛ " ..... 25¢
Oil Well Steel Forgings ..... 18¢

Machinery Steel.

	Crucible	Bessemer & Open Hearth.
Ordinary Sizes. ⅜ to 2 inch Round	4¢	2½¢
5-16 and 2⅛ to 3 inches	5¢	3½¢
¼ and 3¼ to 6 "	6¢	4½¢
7-32 inch	7¢	5½¢
3-16 "	9¢	8 ¢

Square, Flat and Octagon, ½¢ extra throughout the list.

Cut to specified lengths, ½¢ extra.

Hammer Cast Steel.

Crucible Cast Steel ..... 5¢
Open Hearth Cast Steel ..... 4¢

Sheet Steel.—*Crucible.*

	Best.	2d Qual.	3d Qual.	Bessemer & Open Hearth.
To 21 gauge	9¢	8¢	6¢	5¢

1¢ extra for each additional gauge.

Cut to multiples or specified lengths, ½¢ extra.

Miscellaneous Cast Steel.

Auger and Auger Bit ..... 3¢
Axle Steel for carriages and wagons ..... 3¢
Frog Points and Plates ..... 5½¢
Frog Side Bars ..... 5¢
Pick, plain (hammered) ..... 5¢
Pick and Mattock, beveled rolled ..... 3¢
Skate Steel ..... 4½¢
Table Cutlery, plain ..... 3½¢
Table Cutlery, beveled ..... 4¢
Pike and Cant Hook ..... 7¢
Coal and Granite Wedge ..... 7¢
Roller ..... 7¢
Spindle, subject to Machinery classification ..... 5½¢
Trap Spring Steel ..... 5¢
Forged Crank Pins and Lathe Spindles ..... 7½¢
Piston Rods, plain ..... 5¢
Piston Rods, forged to shapes ..... 7½¢
Slide Bars, plain ..... 5¢
Slide Bars, forged to shapes ..... 7½¢

Plate Steel.

Shell Steel, ¼ inch thick and heavier ..... 3½¢
Flange Steel, ¼ inch thick and heavier ..... 3½¢
Fire-Box Steel, ¼ inch thick and heavier ..... 4½¢
Circulars and semi-circulars, when ordered separately, extra ℔ ℔ ..... 5½¢
Smoke Stack, to shape ..... 5¢
Locomotive Tank Steel ..... 4¢

File Cast Steel.

Square, Round, Half Round and Flat Bastard, 8 inch and over ..... 5¢
Mill Saw, 8-inch and over ..... 5¢
Taper, 3¼-inch and over ..... 6¢
Horse and Shoe Rasp ..... 5¢

Spring Cast Steel.

Spiral, Taper, cut to lengths ..... 4¢

Tire Cast Steel.

Spiral, Taper, cut to lengths ..... 5½¢

1x¼ and over ..... 6½¢
1x3-16, ¼x3-16 and ¼ ..... 7¢
1 and 13-16x⅛ and 5-32, ¾x3-16 and 5-32 ..... 9¢
⅝ and ⅝x⅛ and 3-32 and 12 g ..... 10¢
Solid Safe Cast Steel ..... 4¢
Three and Five Ply Cast Steel ..... 5¢

Agricultural Implement Cast Steel.

Fork and Rake, Crucible ..... 4¢
Horse Rake Steel, cut to lengths, Crucible ..... 5¢
Hoe, Crucible ..... 5¢
Corn Stalk Cutter, beveled ..... 4¢
Beveled Hoe and Shovel Steel in Bars ..... 4½¢
Crucible Plow Steel in Slabs ..... 4¢

Bessemer and Open Hearth.

Spring ..... 2 6-10¢
Spring spiral and taper, cut to lengths ..... 3½¢
Tire, 2-16 thick and above ..... 2 2-10¢
Toe Calk ..... 2 4-10¢
Plow ..... 2¼¢
Axle Billets ..... 2 1-10¢
Sleigh Shoe ..... 2 1-10¢
Cutter Shoe, cut to lengths and tapered ..... 3¢
Scythe Back Steel ..... 3¢
Grain Drill Bars ..... 2½¢
Grain Drill Points ..... 3½¢
Rolling Coulter Blanks, cut and punched ..... 6¢
Thrasher Steel ..... 2½¢
Thrasher Teeth ..... 3½¢
Rolled Hammer Billets ..... 2½¢

Terms.—Four months; 3 per cent. discount for cash if remitted within 30 days.

Rolls and Castings.

Furnace Floor and Straightening Plates ..... 1½¢
Housings and Castings not otherwise specified ..... 2 ¢
Guide Plates ..... 2½¢
Spindles and Coupling Boxes ..... 1¾¢
Sand Rolls and Pinions, large size 2
Sand Rolls and Pinions, small size ..... 2¼¢
Pipe Mill Castings ..... 3 ¢
Rolling Mill Castings under 50 ℔ ..... 2 ¢
Spur and Bevel Wheels, large ..... 3¢
Spur and Bevel Wheels, small ..... 3½¢
Pulleys up to 30 inches ..... 4 ¢
Pulleys over 30 inches ..... 3½¢
Engine Castings, light ..... 3½¢
Engine Castings, heavy ..... 3¾¢

White and Red Lead.

Strictly Pure White Lead in Oil, in Kegs 6¾¢ ℔ ℔; in lots of less than 500 ℔ 7¢ ℔ ℔ net; in 25-℔ Cans, packed in 100 ℔ cases, ½¢, and 12½ ℔ cans' 1¢ over keg price; in 1 to 5 ℔ Cans, assorted, in 100 ℔ cases, 2½¢ over keg price.
Strictly Pure Dry White Lead in kegs, ℔ ℔ ..... 6¼¢
Strictly Pure Red Lead *extra bright and fine*, in kegs ..... 6¼¢
Strictly Pure Litharge, *powdered, extra fine*, in kegs ..... 5¼¢
Orange Mineral, *True*, in barrels ..... 8¼¢
" in 100 ℔ kegs ..... 8¼¢

Terms: Note or acceptance at 90 days; or less 2½ % for cash if paid within 15 days from date of invoice.

Freight equalized with all points where White Lead is made.

Window Glass.

Discount, 75% Single Strength 75 & 10% Double. Prices current, ℔ box of 50 feet.

Single Strength.

United Inches	Sizes.	AA.	A.	B.	C.
25	6 x 8 to 10 x 15	$8.75	$8.00	$7.50	$7.00
39	11 x 14 to 15 x 24	9.25	8.50	8.00	7.25
48	16 x 24 to 20 x 28	10.75	9.75	8.75	7.75
54	15 x 34 to 24 x 30	12.25	10.75	9.00	....
60	26 x 28 to 24 x 36	13.00	11.50	9.75	....
70	26 x 36 to 26 x 44	14.50	13.25	10.75	....
80	26 x 46 to 30 x 50	15.00	14.00	11.25	....
84	30 x 52 to 30 x 54	....	....	....	....
90	30 x 56 to 34 x 56	....	....	....	....
94	34 x 58 to 34 x 60	....	....	....	....
100	36 x 60 to 40 x 60	....	....	....	....
	Double Strength.				
25	6 x 8 to 10 x 15	13.25	12.25	11.25	10.50
39	11 x 14 to 15 x 24	14.50	13.25	12.50	11.25
48	16 x 24 to 20 x 28	17.25	15.75	14.00	....
54	15 x 34 to 24 x 30	19.75	17.25	14.50	....
60	26 x 28 to 24 x 36	$21.00	18.50	15.75	....
70	26 x 36 to 26 x 44	23.25	21.25	17.25	....
80	26 x 46 to 30 x 50	24.00	22.50	18.00	....
84	30 x 52 to 30 x 54	25.75	23.25	19.25	....
90	30 x 56 to 34 x 56	27.75	25.00	21.75	....
94	35 x 58 to 34 x 60	29.25	27.75	24.00	....
	36 x 60 to 40 x 60	33.25	30.00	27.75	....

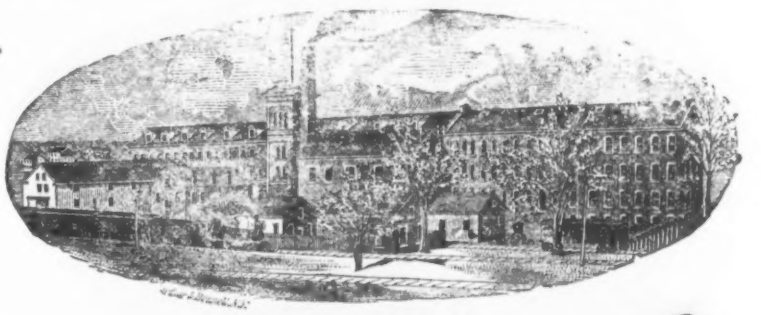
Sizes above — $10 ℔ box extra for every 5 inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches bracket.

Hubbard, & Co.'s Goods.

Axes, Single Bit, Lippincott ..... per doz. $6.50
Axes, Single Bit, James & Co ..... per doz. 5.50
Axes, Double Bit, Lippincott ..... per doz. $12.00
Axes, Double Bit, James & Co ..... per doz. 10.00
Drain Tools, list ..... dis 20&7½ %
Hoes, Planters' ..... dis 60 %
Hoes, Scovill Pattern ..... dis 60 %
Hoes, Handled, Square Eye, German ..... dis 60 %
Handles, Cross Cut ..... per doz., $2.25
Handles, Shovel, Bent, Bored, Riveted ..... per doz., 2.00
Saws, Circular ..... dis 50 %
Saws, Long ..... dis 45 %
Saws, Cross-Cut, H. B. & Co., Champion, per foot net $0.27
Saws, Cross-Cut, Lippincott, Champion, per foot net $0.25
Shovels, list ..... dis 20&7½ %
Spades, list ..... dis 20&7½ %
..... dis 20&7½ %

THE STANLEY WORKS,



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BUTTS, HINGES AND DOOR BOLTS

FACTORIES:
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GOODS FURNISHED PLAIN, GALVANIZED, JAPANNED, BRONZED AND NICKEL PLATED.

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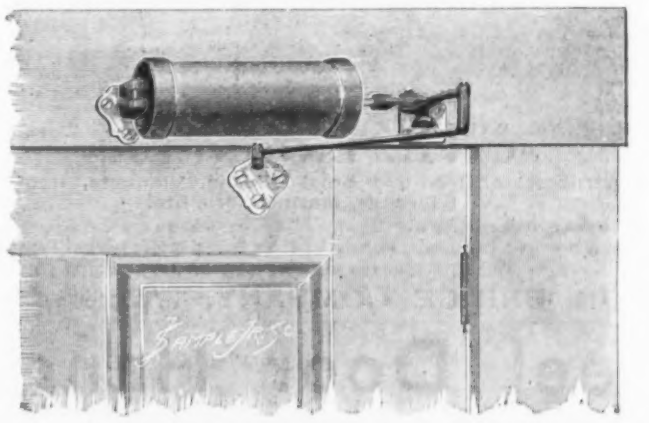
IMPROVEMENT!

THE SHAW DOOR CHECK AND SPRING.

The Lowest in Price. Can be Attached by any Mechanic. Sold like other Hardware. The same Spring Attachable to Hinge or Jamb Side of Right or Left Hand Doors. No Special Agents. Liberal Discounts.



This device absolutely prevents the slamming of doors, permitting them to open easily, and is invaluable for Stores, Houses, Churches, Halls, Theatres and Buildings generally. It is sold ONE DOLLAR cheaper than any other Spring Check in the market. Thousands are in use and are gi

BROUGHTON'S
BURGLAR-PROOF SASH LOCKS.
(Patented Oct. 7th, 1879.)
FOR NET BOTTOM PRICES SEE PAGE AD. IN IRON AGE, FEB. 11th.

For Net Bottom Prices see Page Adv. *Iron Age*, FEB. 11th

No 210, Ornamental Iron, Iron Knob, fine finish, Etruscan Bronze.....$0.60
No. 211, Ornamental Iron, Iron Knob, fine finish, Olympian Bronze.....75
No. 212, Ornamental Iron, Iron Knob, fine finish, Pompeii Bronze.....85
No. 213, Ornamental Iron, Iron Knob, Nickel-plated.....1.25
No. 214, Ornamental Iron, Iron Knob, Nickel-Plated Rich Old Gold inlaid.....1.50
No. 215, Ornamental Iron, Iron Knob, Nickel-plated, Pale Old Gold inlaid.....1.60
No. 216, Ornamental Iron, Iron Knob, Nickel-plated, Fire Old Gold inlaid.....1.75
No. 217, Ornamental Iron, Iron Knob, Nickel-plated, Crimson Old Gold inlaid.....1.85
No. 218, Ornamental Iron, Iron Knob, Nickel-plated, Blue Old Gold inlaid.....1.90
No. 219, Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold inlaid.....1.95
No. 220, Ornamental Iron, Iron Knob, Nickel-plated, Copper Old Gold inlaid.....2.00
No. 221, Ornamental Iron, Iron Knob, Nickel-plated, Lemon Old Gold inlaid.....2.05
No. 222, Ornamental Cast Brass, Polished and Lacquered.....2.65
No. 223, Ornamental Cast Brass, Nickel-plated.....3.00

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MANUFACTURERS OF
LOCKS Of Every Description,
AND A FULL LINE OF
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The only manufacturers in the United States who quote bottom prices to all dealers without favoring any class.
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Our terms are strictly 15 days, f. o. b. Reading, no charge for cases or cartage.

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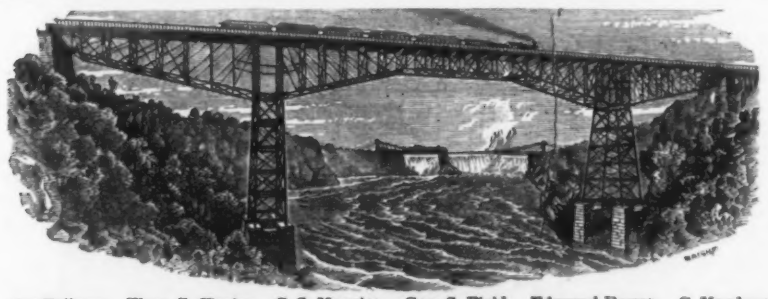

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CIVIL ENGINEERS
And Constructors of Iron and Steel Bridges, Viaducts, Roofs, Elevated Railroads, Marine Piers, Etc.
Works: Athens, Pa. (Late Kellogg & Maurice.) Capacity, 14,000 tons.
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DESIGNS AND ESTIMATES WILL BE SENT ON APPLICATION TO
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Steel Door Hangers
FOR EVERY PURPOSE.

Anti-friction Steel Barn Door Hangers.
Three sizes of Steel Common Hangers.
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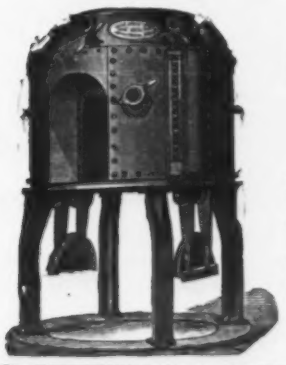
Special shapes and sizes of Hangers made to order.
All Hangers made for either Iron or Wood Track.
Wrought-Iron, Lock-Joint, Round-Edge Hanger Track in any desired lengths and sizes.
Track Brackets, Stay Rollers, Combination Latches, Automatic Gate Hinges.
The most complete and finest line of these goods manufactured.
Prices the lowest. Catalogues and Lists on application.
SCRANTON MFG. CO., 68 to 74 W. Monroe St., Chicago.



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FOUNDRY CUPOLA.
Made in six sizes, with capacity from one to fifteen tons per hour Adapted to all classes of work, for light or heavy castings, and excels all others in *Economy of Fuel and Iron*. Address
COLLIAU FURNACE CO.,
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Write for estimates and mention this paper.

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THE BRUSH-SWAN ELECTRIC LIGHT CO.,
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Where Electric Apparatus for all the various modes of lighting and transmitting of Power are in operation.
No other system is as economical in Installation and Maintenance. No other Electric Light is as durable—the first machines made are still in daily operation.
The System Comprises
Arc Lights of various sizes.
Arc and Incandescent Lights from one Dynamo and Circuit.
Incandescent Lights of various sizes from special Dynamo for Central Station Lighting
Cost of Apparatus greatly reduced. *Surveys and Estimates by experts.*

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STEEL NAILS
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Porcelain, Mineral & Jet Knobs & Escutcheons.
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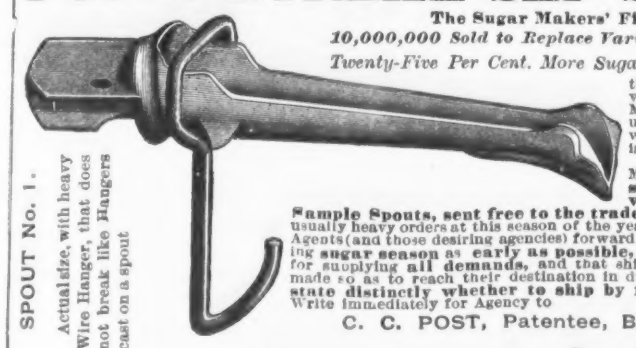
10,000,000 Sold to Replace Various Other Kinds.
Twenty-Five Per Cent. More Sugar and a Better Quality



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than from any others, is the verdict of over 20,000 Maple Sugar Makers who use them. Their perfect working with satisfaction is guaranteed.
Agents wanted in every Maple Sugar Town. Descriptive Circulars, with Price Lists and
Sample Spouts, sent free to the trade only. Owing to the unusually heavy orders at this season of the year, it is necessary that all Agents (and those desiring agencies) forward their orders for the coming **sugar season** as **early as possible**, to give the required time for supplying **all demands**, and that shipments by freight can be made so as to reach their destination in due season. **In ordering state distinctly whether to ship by freight or by express.**
Write immediately for Agency to
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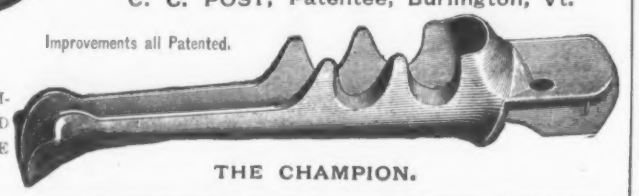
Improvements all Patented.



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Twist Drills
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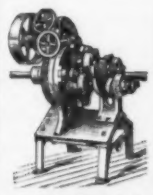

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Will take off the thickest crust of lime by passing once through.
Noiseless, self-feeding, adjustable and reversible, and needs no counter-shaft. Occupies but little room.
Circulars, with full description, on application.
L. B. FLANDERS MACHINE WORKS,
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Coiled Wire Belting.
Takes the place of ALL ROUND Belting.
Cheaper, more durable. Increases power. Is not affected by water, oil, steam or weather.
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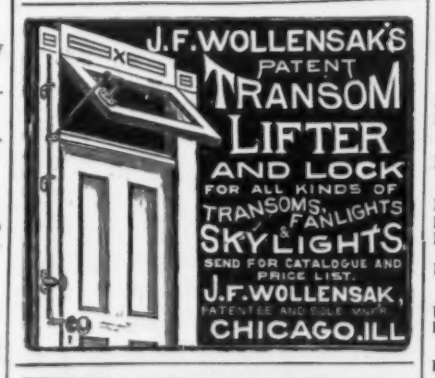

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Iron Frame Cultivators and Horse Hoes, Cucumber Wood Pumps, Canal Barrows, Corn Shellers, Hay Cutters, Grindstones mounted on frames, Steel goods of all kinds.
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BROWN'S SASH LOCK
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Holds and LOCKS SASH at ANY point.
THE SIMPLEST and BEST.

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Reported by Bigelow & Dowse.

Anvil & Vise.—

	10	20	30	40	
Cheney	$3.50	4.50	5.50	6.50	dis 25 %

Eagle, Fisher & Norris, No. 00, $1.75; 0, $2.25; 1, $2.75; 2, $3.25; 3, $4.00; 4, $4.50; 5, $5.25; 6, $6.00; 7, $6.50; 8, $7.25; 9, $8.25.
100 ℔ and over 10¢ ℔.....dis. 20 %

Augers & Bitts.—
L'Hommedieu's Ship Auger.....dis 15 %
Jenning's Bitts.....dis 25 %
Cook's Bitts.....dis 50 %
Shepardson's Double-Cut Bitts.....dis 45 %
Shepardson's Double Gimlets.....dis 40 %
Stearn's Extension Hollow Augers—
No. 2, ₩ doz., $48; No. 3, ₩ doz., $60 list.....dis 20 %
Bonney's Extension Hollow Augers.....₩ doz $36.00
Pierce's Bitts.....dis 50 %
Griswold Bitts.....dis 60&10 %
Axes.—Blue Jackets.....₩ doz $7.50
Ax Handles.—
Oak Extra, 31 in., No. A.....₩ doz $2.50
Oak Extra, 34 in., No. A.....₩ doz 2.50
Oak Extra, 31 in., No. B.....₩ doz 2.00
Oak Extra, 34 in., No. B.....₩ doz 2.00
Oak Extra, 31 or 34 in., No. C.....₩ doz 1.40
Axle Clips......dis 50 %
Balances.—Chatillon's.....dis 40 %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers).....₩ ft., 2¢
Cast Half Round.....₩ ft., ⅜, 2½¢; ½, 3¢
Wrought Round.....₩ ft., ⅛, 3¢; ⅜, 4¢; ¾, 5¢
Bells.—Connel's Crank Gong, reduced list..dis 20&10 %
Bird Cages.
Japanned M. B. & D., reduced list, 1879.....dis 40 %
Brass M. B. & D. reduced list, 1879.....dis 33⅓ %
Blind Fasts.
No. 6 Fasts.....₩ C sets 6.00
Shedd's.....₩ C sets 6.50
Blind Hinges.—Mall. Hook, 3 holes..₩ C sets 7.00
Blocks.—Tackle.....dis 20 %
Brad Awl Handles.—
Phœnix Adjustable.....₩ doz $2.00
Bolts.—Norway Iron Carriage.....dis 75 %
Common Carriage, new list.....dis 75&10 %
Eagle Carriage.....dis 75 %
Borax.—Refined.....₩ ℔ 12¢
Boring Machines.—
Eagle Upright, each.....$5.50 list } dis 50 %
Eagle Angle, each.....6.75 list }
Braces.—Barber's.....dis50 %
Spofford's.....dis 50&5 %
Backus's.....
Bracket Saws.—Holly Scroll Saw.....each $2.25
Bracket Saws, extra quality, to No.5.....₩ gro. 0.75
Steel Frame, with patterns.....₩ doz 6.00
Lester.....dis 20 %
New Rogers, all iron.....dis 25 %
Bracket Saw Blades.—Grimth's pat., ₩ gross 75¢
Brackets.—
P. S. & W. Flower Pot, reduced list.....dis 40&10 %
Bronzed Shelf M. B. & D., new list.....dis 50&10 %
Store Shelf.....dis 40&10 %
Butts.—Union Fast Joint.....dis 60&10 %
Union Loose Joints.....dis 70&10 %
Union Japanned Acorn.....dis 70&10 %
Union Silvered Acorn.....dis 70&10 %
Union Boston Finish.....dis 75&10 %
Union Spiral Spring.....dis 25&10 %
Wrought Brass.....dis 70 %
Carriage Bolts.—Eagle Norway.....dis 75 %
Common, new list.....dis 75&10 %
Carriage Jacks.—Climax No. 1.....₩ doz $20.00
Climax No. 1½.....₩ doz 15.00
Climax No. 2.....₩ doz 13.50
Universal.....dis 25 %
Universal No. 1.....each $2.00
Universal No. 2.....each 3.00
Universal No. 3.....each 6.00
Universal No. 4.....each 6.00
Universal No. 5.....each 6.50
Cartridges.—U. S. Cartridge Co.....dis 60 %
Cards
Watson's make Horse & Curry...dis 10 % } Rev. List.
Watson's Cotton.....dis 10 % } Aug., 1883.
Watson's Wool.....dis 10 % }
Casters.—Bed and Table.....dis 50&10 %
Chain.
Coil 3-16.....₩ ℔ 9¢
Coil ¼.....₩ ℔ 7¢
Coil 5-16.....₩ ℔ 6¢
Coil ⅜.....₩ ℔ 5¢
Coil 7-16.....₩ ℔ 5¢
Coil ½.....₩ ℔ 5¢
Chalk.—White, Carpenter's.....₩ gross 60¢
Red, Carpenter's.....₩ gross 80¢
Blue, Carpenter's.....₩ gross $1.00
Crayons.....12¢
Chisels.—Peck, Stow & Wilcox.....dis 70&10 %
Underhill, Framing.....dis 35 %
Buck's Chisels.....dis 30 %
Coal Hods.—Galv'd, New List.....dis 60 & 10 %
Japanned, New List.....dis 60 & 10 %
Cocks.—Brass. L. F. & Co.....dis 50&10 %
Coffee Mills.—New List.....dis 40&10%
Copper Rivets.—.....dis 50 %
Cordage.—Manila, usual trade dis 1¢.....₩ ℔ 14¢
Jute.....₩ ℔ 7¢
Cow Ties......dis 50&10 %
No. 30 3 ft. No. 6 Wire, with toggle.....₩ doz $3.80
No. 35, 3 ft. No. 6 Wire, with snap.....₩ doz 4.00
No. 40, 3½ ft. No. 6 Wire, with toggle.....₩ doz 4.30
No. 45, 3½ ft. No. 6 Wire, with snap.....₩ doz 4.50
No. 50, 4 ft. No. 4 Wire, with toggle.....₩ doz 4.75
No. 55, 4 ft. No. 4 Wire, with snap.....₩ doz 5.00
No. 60, 4½ ft. No. 3 Wire, with toggle.....₩ doz 5.60
No. 65, 4½ ft. No. 3 Wire, with snap.....₩ doz 5.80
Crow Bars.—Cast Steel.....₩ ℔ 6¢

Cutlery.—Pocket American Shear Co.'s.....dis 40 %
Butcher Knives, Wood's, Lap Bolster, Square Handle.....dis 40 %
Steak Knives.....dis 40 %
Lap Bolster, Oval Handle.....dis 40 %
Sticking.....dis 40 %
Skinning.....dis 40 %
Butcher, Common Round Handle, Wood's.....dis 40 %
Shoe Knives, Wood's.....dis 30 %
Dividers.—Cook's.....dis 25 %
Dog Collars......dis 20 %
Door Springs.—Torrey's Rod.....₩ doz $1.62
Imitation Torrey's Rod.....₩ doz 1.45
Gem Coil, new list.....dis 50&10 %
Crown.....₩ doz $1.25
Warner's.....₩ doz 1.75
Door Stops.—Thurston's.....dis 50 %
Drawer Knobs.—Thurston's.....dis 50 %
Drills.—Morse Bitt Stock.....} dis 40&10%
Morse Straight Shank.....}
Emery.—Wellington Mills.....₩ ℔ 10¢
Walpole Emery Mills.....₩ ℔ 5¢
Turkish, in 10 ℔ cans.....₩ ℔ 7¢
Enameled Ware.—
Standard Mfg. Co. Kettles.....dis 50 %
Standard Sauce Pans.....dis 25 %
Felloe Plates.—Wrought.....₩ ℔ ¢
Files.—American File Co.....dis 60 %
Nicholson File Co.....dis 60 %
Fluting Machines.—Knox List, $4.00.....dis 25 %
Forks.—W. C. & Co.....dis 60 %
Eastern Tool Co.'s. Manure.....dis 60 %
Gimlet Bits.—
Genuine German, No. 125, 1-32 to 8-32.....₩ doz $1.00
Pierce's.....₩ doz .88
Glass Cutters.—Combination Glass Cutter and Knife Sharpener.....₩ doz $1.00
Grub Hoes.—K. P. & Co.'s No. 2, $11.50 ₩ doz. dis 50 & 10 %
Hammers.—Maydole's.....dis 25 %
Hartford Hammer Co.....dis 20 %
Hangers & Rollers.—Anti-Friction.....dis 50 %
Acme Rollers.....dis 50 %
Climax.....dis 50 %
Common Hangers.....dis 50&10 %
Common Rollers.....dis 50&10 %
Victor Hangers.....dis 50 %
Victor Rail.....dis 50 %
Hand Screws......dis 10 %
Hatchets.—C. F. Dowse, new list.....dis 40 %
Underhill.....dis 40 %
Hay Knives.—Lightning.....₩ doz $18.00, net
Hinges.—Strap and T (new list).....dis 65 %
Providence Plate.....₩ ℔ 5¢
Wrought Screw Hook.....₩ ℔ 5¢
Hoes.—Eastern Tool Co.....dis 60&10 %
W. C. & Co.'s.....dis 60 %
Hooks and Staples.—Brewers (new list)...dis 70 %
Horse Nails......

	No. 6	7	8	9	
Putnam Pointed	.24	.22	.21	.20	.....5&7 %
Bridgewater	.23	.21	.20	19	.....30 %

Ice Cream Freezers.—Packer's, new list.dis 50&10%
Knobs.—"Norwalk." New list.....dis 50 %
Silver Glass.....dis 50&10 %
Silver Glass Bell Pulls.....dis 50&10 %
Lanterns.—Tubulars, No. 0.....₩ doz $7.50
Lawn Mowers.
Continental.....dis 40&10 %
Quaker City.....dis 40&10 %
National.....dis 50 %
Lead.—Sheet.....₩ ℔ 7¢
Pipe.....₩ ℔ 6¼¢
Locks.—Norwalk.....dis 50 %
Eagle Cabinet.....dis 40 %
Eagle Trunk.....dis 15 %
Mallory, Wheeler & Co.....dis 66⅔ %
Manure Forks.—W. C. & Co.....dis 60 %
Eastern Tool Co.'s.....dis 60 %
Mattocks.
K. P. & Co., Long Cutter, $16.00 ₩ doz.....dis 50 & 10 %
K. P. & Co., Short Cutter, $15.50 ₩ doz..dis 50 & 10 %
K. P. & Co., Pick Cutter, $16.00 ₩ doz....dis 50 & 10 %
Measuring Tapes.—Eddy's.....dis 20 %
Meat Cutters.—Miles' Challenge.....dis 30 %
Hale's (new list).....dis 40&10 %
American.....dis 33⅓ %
Money Drawers.—Tucker's Alarm....₩ doz $22.50
Mouse Traps.—Delusion.....₩ doz 1.25
Novelty.....₩ doz
Nails......₩ keg $2.65
Oilers.—Zinc and Tin.....dis 60 %
Brass and Copper.....dis 50 %
Ox Bows.—Extra finished and varnished....dis 15 %
1¼ in., ₩ doz. pair...$7.00 | 2 in., ₩ doz. pair..$10.00
1⅝ in., ₩ doz. pair... 9.00 | 2⅜ in., ₩ doz. pair.. 12.00
Paper.—Common Tarred Sheathing.....₩ ℔ 1¼¢
Eagle Brand Tarred Sheathing.....₩ ℔ 2 ¢
Common, Dry Sheathing.....₩ ℔ 1¾¢
Eagle Brand Dry Sheathing.....₩ ℔ 2½¢
Picks.—K. P. & Co., Adze Eye, 5 to 6 ℔ $12.00. dis 50 & 10 %
K. P. & Co., Adze Eye, 6 to 7 ℔ $13.00.....dis 50 & 10 %
Planes.
Auburn Tool Co., Bench.....dis 20 %
Auburn Tool Co., Fancy.....dis 15 %
Auburn Tool Co., English Iron.....dis 15 %
N. Y. Tool Co., Bench.....dis 25 %
Plated Ware.—Rogers & Bro.....dis 50&10 %
Pliers.—Vom Cleff & Co.'s.....net list
Button's Wire Pliers.....dis 33⅓ %
Plumb & Levels.—Stanley R. & L. Co..dis 70&10 %
Potato Diggers.—W. C. & Co., reduced list. Eastern Tool Co.'s.....dis 60 %
Pulleys.—Acme or Excelsior, 1¾ in.....₩ doz 22¢
Acme or Excelsior, 2 in.....₩ doz 24¢
Pumps.—Union Manufacturing Co.
Iron Cistern.....dis 50 %
Iron Pitcher Spout.....dis 60 %
Copper.....dis 30 %
Rivets.—In 5 ℔ papers.....dis 45 %
Burrs.....dis 50 %
Copper.....dis 60 %
Razors.—Torrey's.....dis 20 %
Rules.—Stanley, Boxwood.....dis 75&10 %
Stanley, Ivory.....dis 50&10 %
Sad Irons.—Common.....₩ ℔ 3¢
Laundry.....₩ ℔ 6½¢
Tailors' Geese.....₩ ℔ 6 ¢
Enterprise "Potts'".....dis 35 %
Sash Locks.—King & Hutchinson's, new list.dis 40 %
Sandpaper.—Baeder & Adamson.....dis 40 %
Sash Weights.—Patent Eye.....₩ ℔ 1¼¢
Saws.—Hand Saws, Disston's.....dis 20 %
Cross-Cut Saws.
Disston's, Common Tooth.....₩ foot 68¢, dis 45 %
Disston's Great American Tooth..₩ foot 68¢. dis 45 %
Boynton's Lightning Tooth.....₩ foot 45¢
M. B. & D., Hand Saws.....dis 33⅓ %
Richardson Bros.....dis 25 %
Saw Blades.—Disston.....dis 20 %
Welch & Griffith, Extra.....₩ doz $7.20
Welch & Griffith, No. 2.....₩ doz 6.00
Scales.—Fairbanks.....dis 20 %
Screws.
Flat-Head Iron.....new list, dis 83⅓ %
Flat-Head Brass.....new list, dis 83⅓ %
Round-Head Brass.....new list, 81⅓ %
Round-Head Iron.....new list, 81⅓ %
Grilley Round-Head Nickel-Plated Common....66⅔ %
Scythes.—Clippers, in boxes.....₩ doz $6.00
Shaves.—Kimball's.....₩ inch 7½¢
Watrous.....dis 20 %
Shears.—American Shear Co., new list.....dis 70 %
Shot.—Le Roy.....₩ ℔ 6¢
Shovels.—O. Ames, new list.....dis 20 %
O. Ames, other brands, new list.....dis 20 %
Sinks.—Magee Patent.....dis 30 %
Snow Shovels......$3.75
Skates.—Union.....dis 40 %
Stocks and Dies.—King's.....dis 10&5 %
Tacks.
Swedes Tinned.....dis 55&10 %
Swedes Iron.....dis 50&10 %
Gimp and Lace.....dis 45&10 %
Copper Tacks.....dis 50&10 %
Traps.—Oneida, Genuine.....dis 33⅓ %
Oneida, Imitation, H. & N.....dis 60 %
Blake's.....dis 40&10 %
Vises.—Simpson's Adjustable.....dis 25&5 %
Howard Vise Co.....dis 25 %
Prentiss'.....dis 20 %
Weather Strips.—Packer's.....₩ doz $4.50
Browne's Flexible Rubber.....dis 30 %
In 25 feet boxes: No. 1, ⅛ in. wide, ₩ yard, 10¢.
No. 2, ⅜ in., 15¢.; No. 3, ⅝ in., 20¢.: No. 4, 1 in., 25¢
Black Walnut Spring Weather Strips.....₩ doz $3.50
Window Springs......dis 35 %
Babcock's No. 3.....₩ gross $6.25
Babcock's No. 4.....₩ gross 4.15
Wire Cloth.—"Clinton".....₩ sq. ft 2 ¢
Wire Fence.
Washburn Painted Barbed.....₩ ℔ 4½¢
Washburn Galvanized Barbed.....₩ ℔ 5½¢
Wire Goods.—Gate Hooks & Eyes.....70&10&5
Wrenches.—A. G. Coe's.....dis 60 %
Girard Mfg. Co.....dis 60&10 %
Girard Agt.....dis 70&10 %
"Always Ready".....dis 25 %
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Novelty for Common Tubs No. 2—10-inch.₩ doz $27.00
" " " " No. 3—11-inch.₩ doz 31.50
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Excelsior for Stationary Tubs No. F 11-inch.....₩ doz 43.50
Excelsior with Folding Bench No. A—10-inch.....₩ doz 48.00
Excelsior with Folding Bench No. B—11-inch.....₩ doz 52.50
Novelty Set Tub, E.....₩ doz ....
Keystone, Wood Frame No. 1½.....₩ doz ....
Keystone, Iron Frame No. 2½.....₩ doz ....
Zinc......₩ ℔

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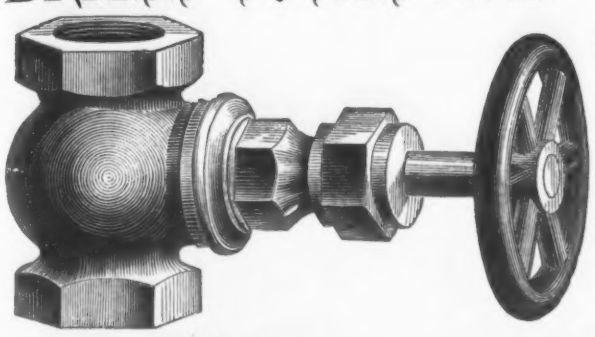

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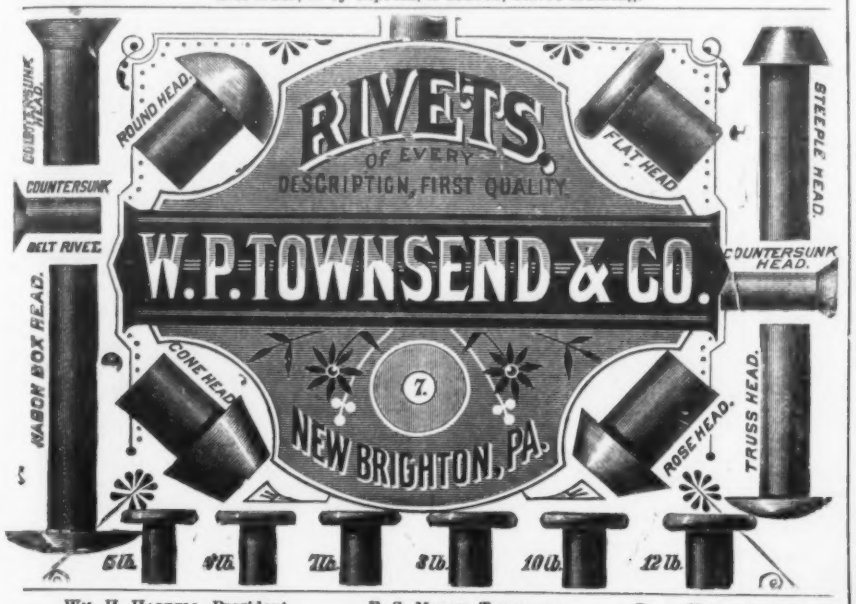

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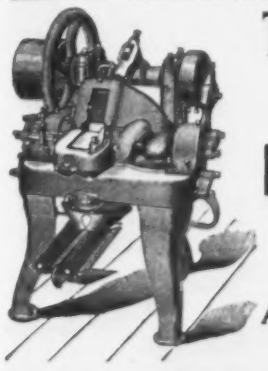

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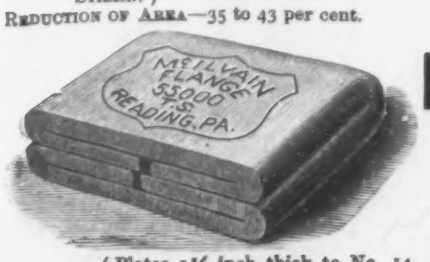

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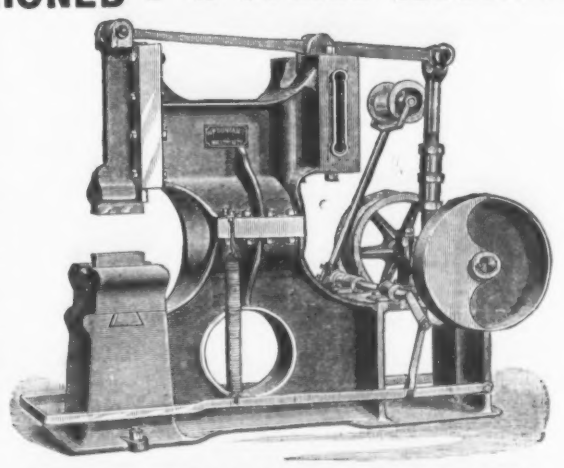

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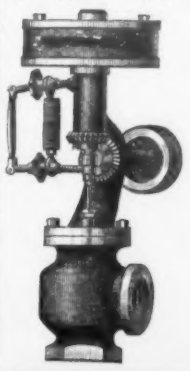

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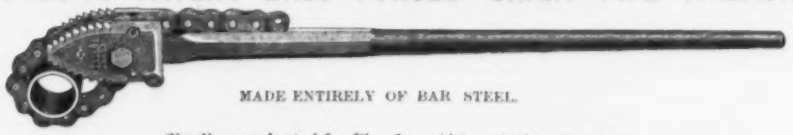

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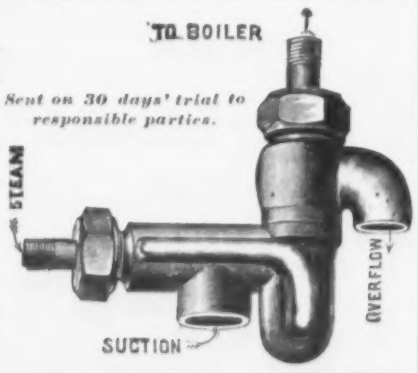

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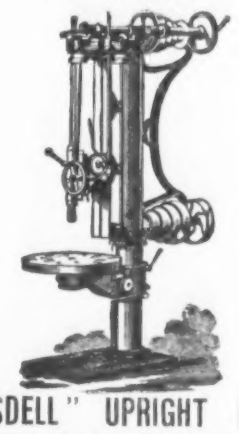

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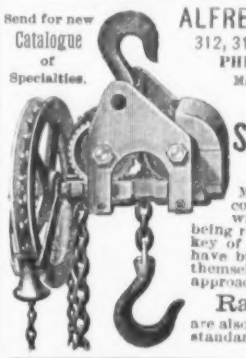

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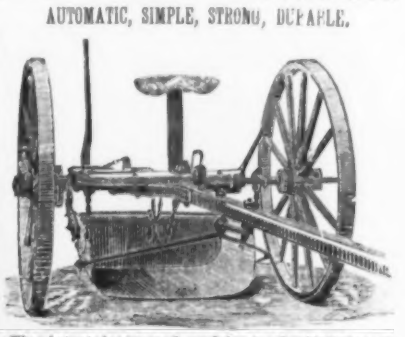

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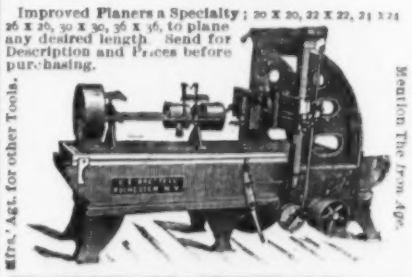

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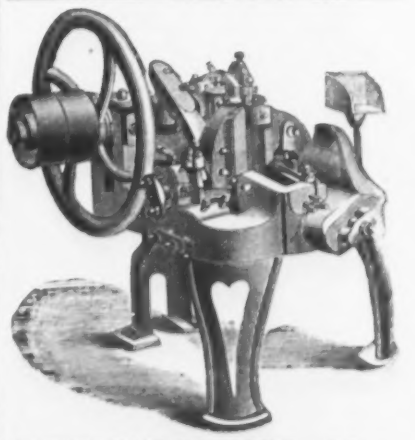

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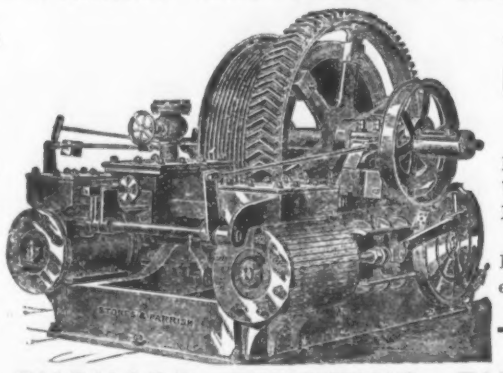

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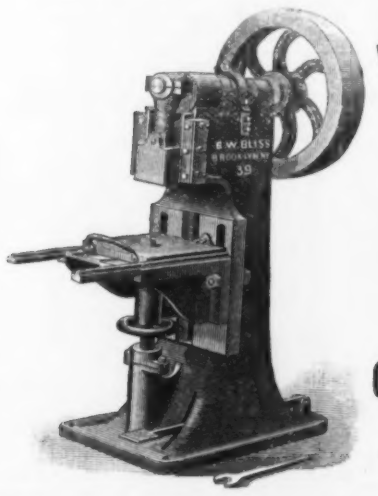

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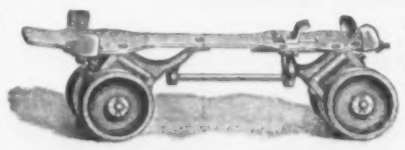

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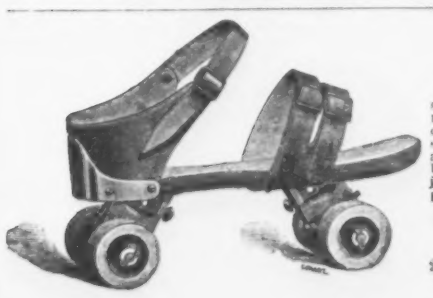

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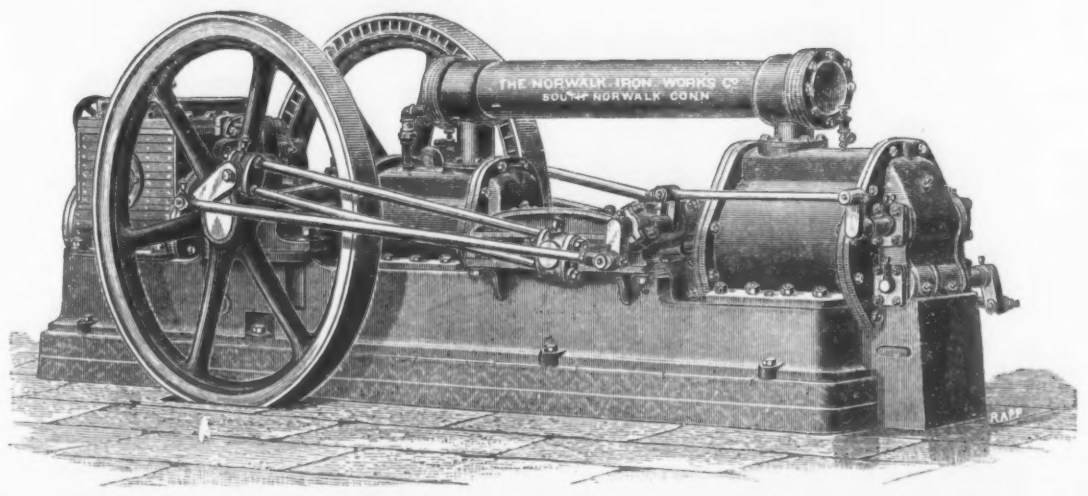

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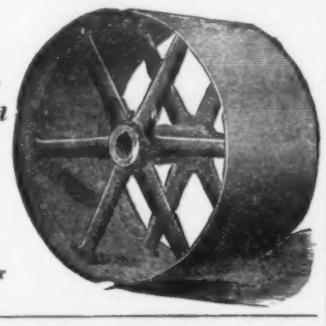

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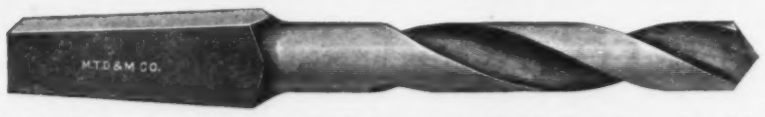

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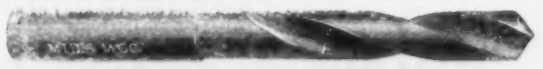
Milling  *Cutters,*

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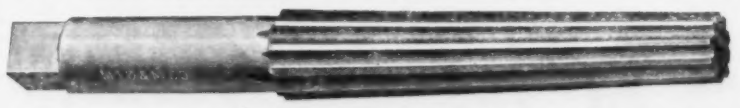

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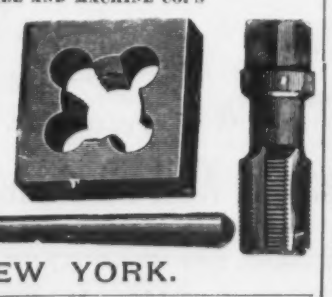

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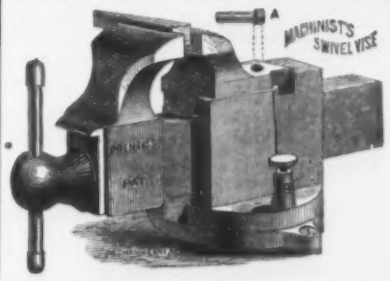

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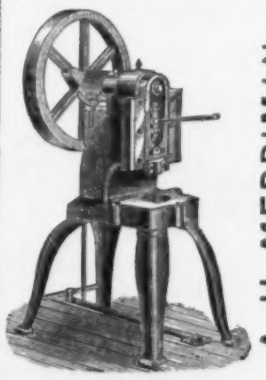

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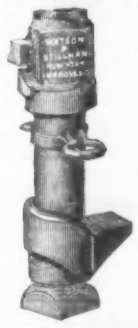

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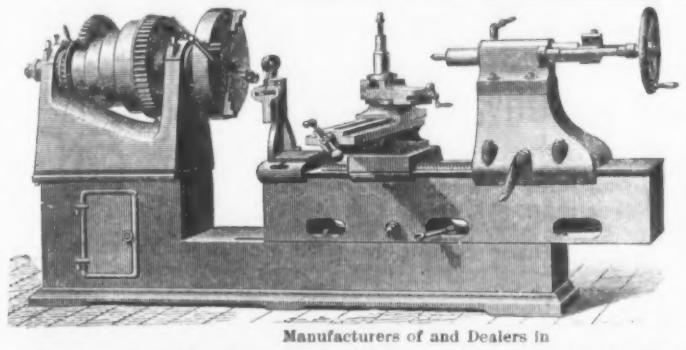

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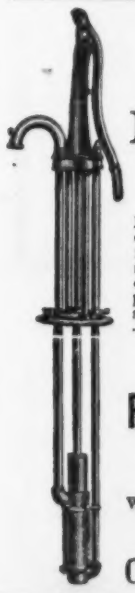

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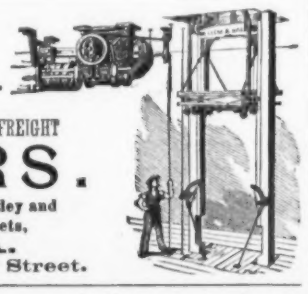

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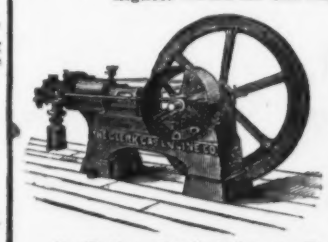

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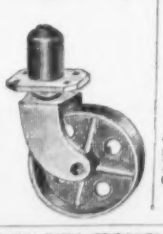

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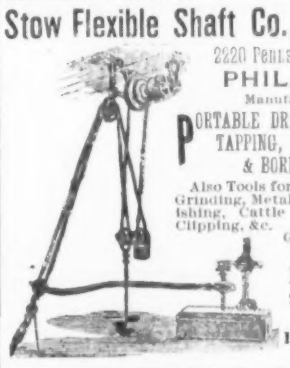

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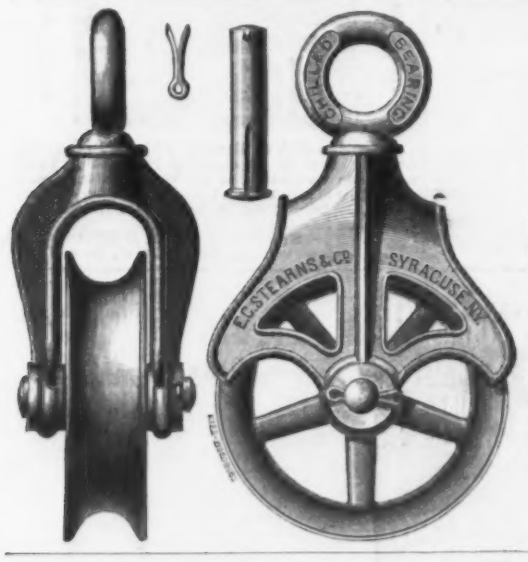

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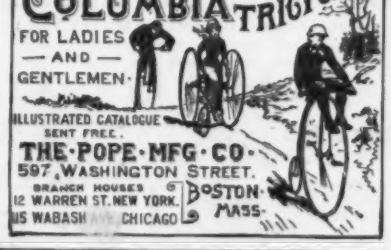

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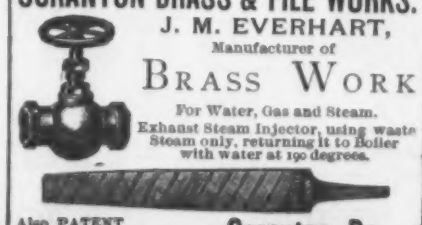

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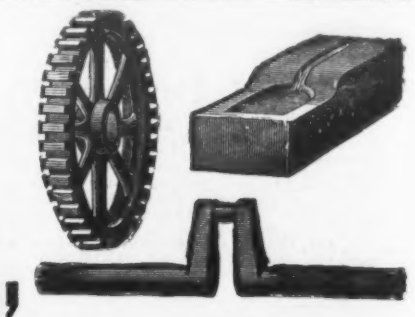

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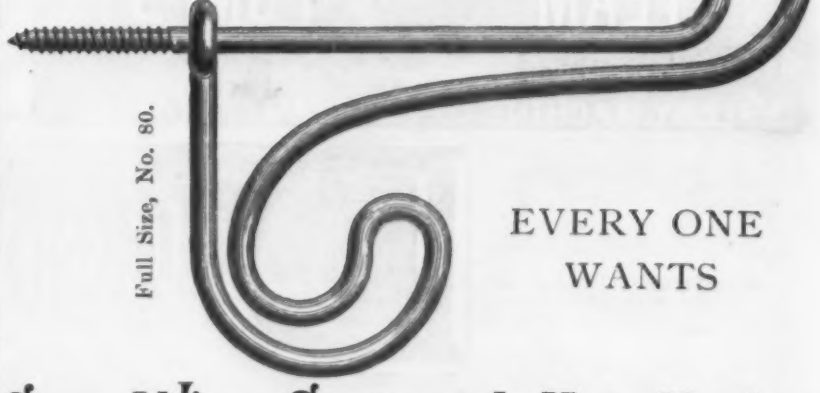

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